Technical Manual

SPLIT SYSTEM AIR CONDITIONER

CAL

50 Hz

Production A.M.N. - JAN

TADIRAN
Air Conditioners

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A. Preface

INTRODUCTION

The Service Manual for CAL model split air-conditioners provides comprehensive technical documentation for the equipment.

This manual contains information intended for a variety of uses and is intended for application engineers, architects, designers and various level service and installation personnel.

This manual includes information on the optional features offered by the CAL series. In addition, it includes general information for service personnel on split air-conditioners, electrical wiring diagrams, refrigeration cycle diagrams and cooling & heating capacity curves for the various series models.

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Tadiran reserves the right to change product specifications without prior notice.

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1. CAL LINE GENERAL DESCRIPTION

1.1 Product Options

Line: CAL

Characteristics: Mini-Central

50Hz Models:

	Options 50Hz Models	C	H
1 PHASE	CAL 18	✔	✔
	CAL 24	✔	✔
	CAL 36	✔	✔
3 PHASE	CAL 363	✔	✔
	CAL 483	✔	✔

H - Heating and Cooling by heat pump.

C - Cooling only (No heat pump).

	- Non Exist
✔	- Exist

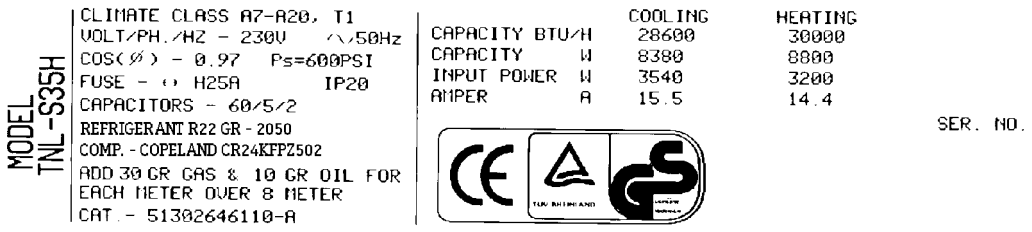
1.2 Nameplate Information

Technical information for a specific unit appears on the unit nameplate, which is attached to the indoor and/or the outdoor units.

(See Figure 1-1: Typical Technical Data Nameplate for 50Hz models).

The 50Hz models Nameplate includes the following information:

MODEL	Air-conditioner (A/C) model name.
CLIMATE CLASS	Type of climate for which the unit was designated - classified by: Class A (standard) or Class B (desert conditions < 52°C.)
VOLT/PHASE/Hz	A/C power supply, for example: 230/1/50 = 230V/1ph/50Hz.
COS (φ)	Power factor for the unit.
FUSE	Required fuse size (Amp.)
CAPACITORS [μF]	All capacitor values according to this sequence (Compressor capacitor / Outdoor motor capacitor / Indoor motor capacitor).
REFRIGERANT R-22 [gr]	Quantity of refrigerant charge (for 8 m piping length).
COMPRESSOR	Type and Catalogue No. of compressor.
CAPACITY BTU/H	Cooling and Heating capacity in Btu/h according to ISO 5151 standard (1000Btu/h=293W).
CAPACITY W	Cooling and Heating capacity in Watts (1000W=3,413Btu/h).
INPUT POWER	Power consumption in cooling and heating modes (Watts).
AMPER	Current consumption in cooling and heating modes (Amp.).
SERIAL NO.	Unit serial number (normally blank, since Bar Code system is used).



1.3 Technical data table

Specifications for CAL (CASSETTE) 50Hz Models

Model	50Hz	CAL-18H	CAL-24H	CAL-36H	CAL-48H
Cooling Capacity	Btu/h Kcal/h (Watt)	20,000 5,050 (5,860)	26,000 6,560 (7,620)	34,000 8,580 (9,960)	45,000 11,360 (13,190)
Heating Capacity	Btu/h Kcal/h (Watt)	21,000 5,300 (6,150)	27,000 6,820 (7,910)	34,000 8,580 (9,960)	45,500 11,490 (13,330)
Power Consumption Cooling	Watt	2,050	2,610	3,780	4,790
Power Consumption Heating	Watt	2,120	2,640	3,110	4,440
Operating Current (Cooling/Heating)	Amp. - 1ph - 3ph	9.4 / 9.7	12.0 / 12.1	17.4 / 14.3 7.9,6.2,6.2/7.5,5.8,5.8	8.8,7.2,7.2/8.7,7.0,7.0
EER – Energy Efficiency Ratio	Cool	9.8	10.0	9.0	9.0
COP– Coefficient Of Performance	Heat	2.9	3.0	3.2	3.0
Moisture Removal	l/h	2.2	2.4	3.2	5.2
Power Supply (Volt/Hz/ph)	1Ph 3Ph	220/240V 50Hz 1ph -		220/240V, 50Hz, 1ph 380/415V, 50Hz, 3ph	- 380/415V, 50Hz, 3ph
Power Factor	φ	0.92	0.95	0.95 (0.92 - 3Ph)	0.92
Refrigerant Lines	ϕ - Inch	1/4" - 1/2"	1/4" - 5/8"	3/8" - 3/4"	3/8" - 3/4"
Maximum Piping Length	m (ft)	30 (98')			
Maximum Height Difference	m (ft)	15 (49')			
Time Delay Fuse - 1ph - 3ph	Amp.	16 -	16 -	25 3×10	- 3×16
Control Mode		I.R. Remote Control / Auto.			
Temperature Control		Microcomputer			
A/C Options:		C / H / HDE (drain pan available for all models)			
Indoor Unit	50Hz	**CAL-I18H**	**CAL-I24H**	**CAL-I36H**	**CAL-I48H**
Front Panel	Color	White			
Air Filter		1 Removable/Washable Filter		2 Removable/Washable Filters	
Unit Dimensions (HxLxD)	mm in	575×575×295 22 5/8×22 5/8×11 5/8		1,175×575×295 46 1/4×22 5/8×11 5/8	
Grill Dimensions (HxLxD)	mm in	720×720×30 28 11/32×28 11/32×1 3/16		1,320×720×30 51 31/32×28 11/32×1 3/16	
Air Flow (Turbo/High/Low)	m^3/h cfm	790 / 700 / 620 465 / 410 / 365	970 / 725 / 650 570 / 425 / 380	1,630 / 1,325 / 1,180 960 / 780 / 695	1,830 / 1,480 / 1,070 1,075 / 870 / 630
Noise Level	dBA	43 / 39 / 35	49 / 42 / 39	46 / 40 / 34	53 / 46 / 39
Unit Net Weight	Kg. (Lb.)	27 (59)	28 (62)	50 (110)	53 (117)
Grill Net Weight	Kg. (Lb.)	3 (6.5)	3 (6.5)	6 (13)	6 (13)
Indoor Fan Motor:	Watt				
Speed (Turbo/High/Low)	R.P.M.	885 / 790 / 700	1130 / 875 / 790	980 / 800 / 710	1190 / 970 / 705
Full Load Amperage	Amp.	0.6		2×0.6	
Motor Capacitor	μF/Volt	2μF / 370V	2.5μF / 370V	2μF / 370V	2.5μF / 370V
Electric Heater (original model)	Watt	1,600	1,600	2×1,200	2×1,200
Blower Wheel	Type				
Outdoor Unit	50Hz	**CAL-O18H**	**CAL-O24H**	**CAL-O36H**	**CAL-O48H**
Casing	Color	White			
Dimensions (HxLxD)	mm in	900×640×320 35 7/16×21 1/4×12 19/32		1100×640×320 43 5/16 × 21 1/4 × 12 19/32	1140×640×400 44 7/8×25 3/16 ×15 3/4
Air Flow (Turbo/High/Low)	m^3/h cfm	4,080 / 3,485 / 2,550 2,400 / 2,050 / 1,500			
Noise Level	dBA	53 / 50 / 46		53 / 50 / 46	54 / 51 / 47
Net Weight	Kg (Lb.)	66 (145)		75 (165)	90 (198)
Fittings	Type	Flare			
Compressor Thermal Protector	1ph 3ph	CR24K6PFZ-502	H29B32UABKA	H28A423ABKA H23A423DBEA Internal Overload	- H23A56QDBEA
Full Load Amperage - 1ph - 3ph	Amp.	10.4	12.4	16.8 3×5.7	- 3×7.5
Lock Rotor Amperage - 1ph - 3ph	Amp.	51.0	76.0	92.0 3×39.0	- 3×62.0
Compressor Capacitor	μF/Volt	45μF / 400V	40μF / 400V	60μF / 400V	-
Capillary	1ph 3ph	2×0.059"×30" -	2×0.064"×32" –	2×0.070"×32" 2×0.070"×32"	- Expansion Valve
R-22 Freon Gas- 1ph - 3ph	gr. (Oz.)	2,050 (72.3)	2,120 (74.8)	2,500 (88.2) 2,500 (88.2)	 3,600 (127.0)
Oil for Compressor	Type	3GS or Compatible			
Outdoor Fan Motor:	HP	1/5			
Motor Capacitor	μF/Volt	5μF / 400V			
Speed	R.P.M.	900 / 700 / 500			
Motor Full Load Amperage	Amp.	1.3			

Specifications and performance data are subject to change without notice.
For CAL-24, CAL-36 and CAL-363, use the tubing adapter that supplied inside the condenser.

OCT. 2000 5130-26135-86

1.4 Standards Compliance and Agency License Listings

✔	- Approved
-	- Not Applicable (N/A)

	50 Hz		
Model	CE	GS(TUV)	EUROVENT
CAL 18	✔	✔	✔
CAL 24	✔	✔	✔
CAL 36	✔	✔	✔
CAL 363	✔	✔	✔
CAL 483	✔	✔	✔

CE - Confirmation according to CE directives.
GS - Geprüfte Sicherheit (safety approved - German law)
ISO - International Standards Organization
EUROVENT - European Committee of air handling, air conditioning and refrigerating equipment manufacturers.

1.5 Bar-code system

Finished goods (packed evaporator or condenser) are labeled by Bar Code for easy identification of product configuration and storage.

Each unit has Bar Code labels as shown below, one on each side of the packed unit and small labels (with unit serial number only) are located on each unit (near the nameplate on the evaporator, beneath the valves and in the connection box of the condenser).

The structure of the Bar Code label:

A. Complete unit name, for example: GFL-2020C (GFL-2020 model without heat pump).
B. Important components (up to 2 lines) about the specific unit, for example: CARRIER MEXICO, NEW R.C, TAC-404.
C. Unit catalog number/order number, for example: CATALOG NO. 51382057712/880472 (prefix of 5138 for evaporator and 5139 for condenser).
D. Unit serial number, for example: S/N 2248119059 = 22 - for factory use; 48 - 1998; 059185 - running (serial) number.
E. Tadiran order number, for example: 880472 = 88 - 1998; 0 group; 472 - order running number.
F. Small S/N cables (X3).

An additional Bar Code label displays the PALLET NO. (see next page) and is used for storage only.

Figure 1-4: Typical Evaporator/Condenser Unit Bar Code Identification Label

Figure 1-5: Typical Pallet Bar Code Label

2. WIRING & REFRIGERATION CYCLE DIAGRAMS, CAPACITY & PRESSURE CHARTS

2.1 Using CAL Model Air-Conditioner Cooling and Heating Capacity Curves

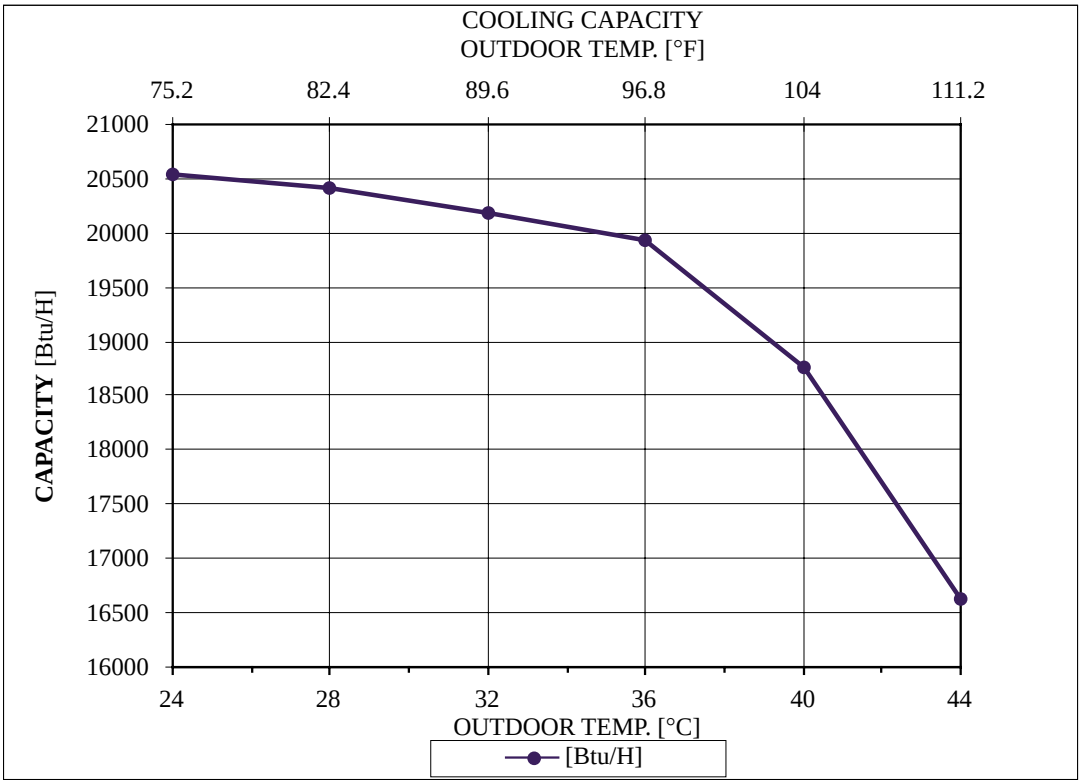
Using the Cooling and Heating Capacity Curves.

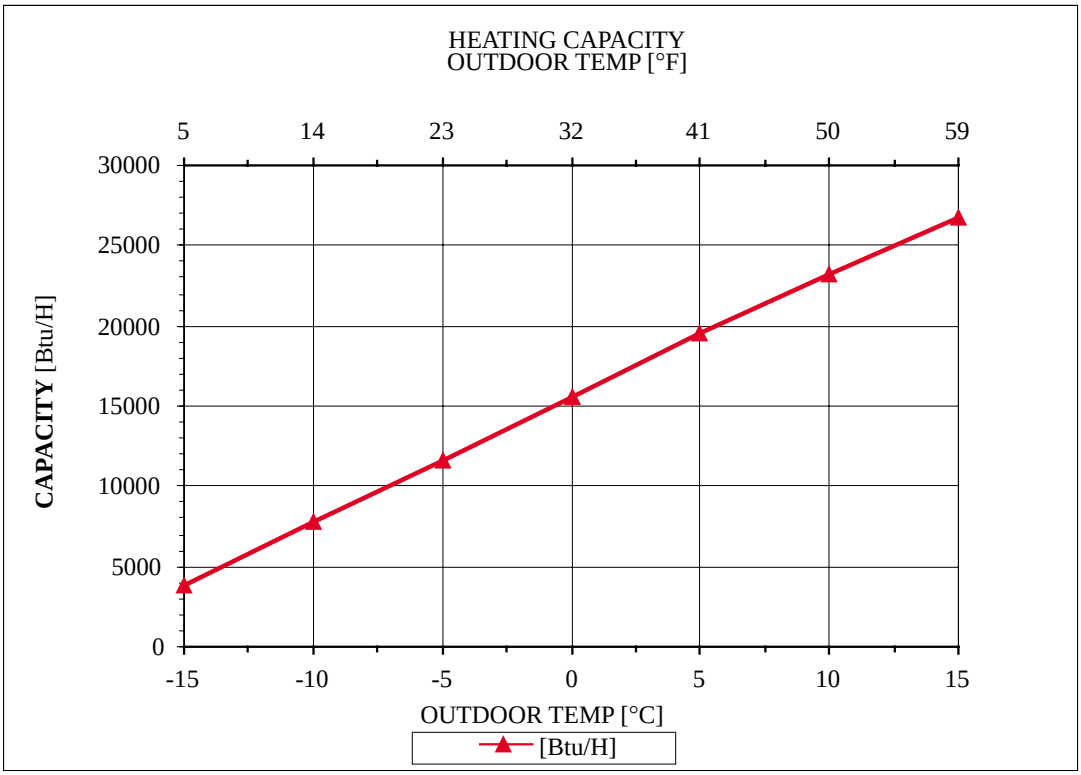
The Cooling and Heating Characteristics curves are mainly intented for use by air conditioning engineers as an aid in designing systems and in determining the capacity and number of units required at a given site.

The air conditioner capacities were determined in accordance with ISO 5151 standard operating conditions:

Design parameters for a given site are often different than the standard conditions. Therefore, the design engineer should use the capacity charts which follow to calculate the capacity of the air conditioners under the intended working conditions, in order to optimize the selection of air conditioner units for use at a particular site.

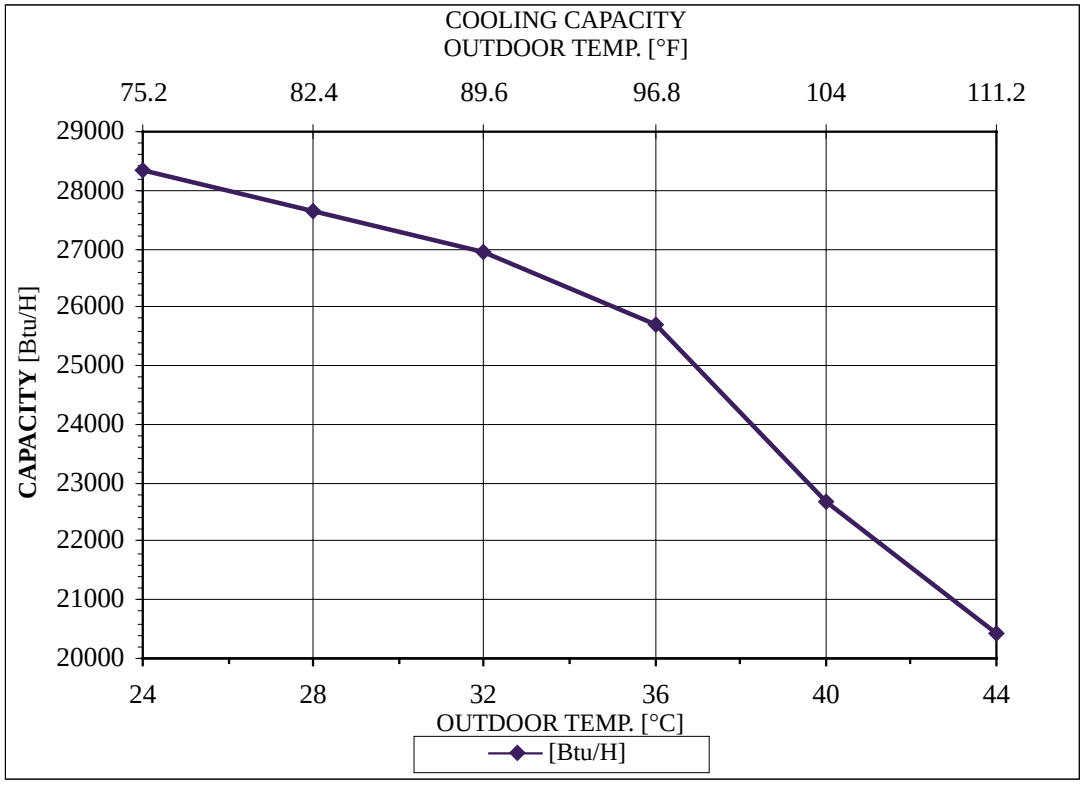
2.1.1 Cooling and Heating Capacity Curves CAL 18

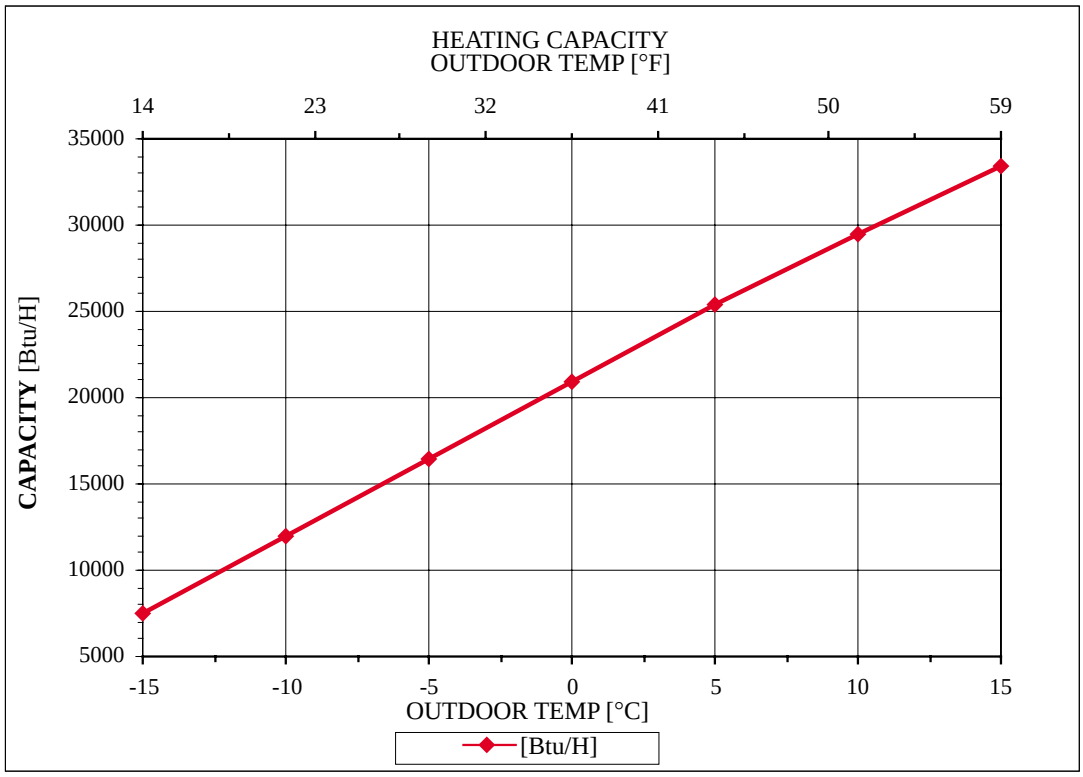




COOLING		HEATING	
* OUTDOOR R.H. =	40%	* OUTDOOR R.H. =	77%
INDOOR R.H. =	47%	INDOOR TEMP. =	20 °C
INDOOR TEMP. =	27 °C	AIR SPEED:	TURBO
MAX. AIR SPEED:	TURBO		

2.1.2 Cooling and Heating Capacity Curves CAL 24

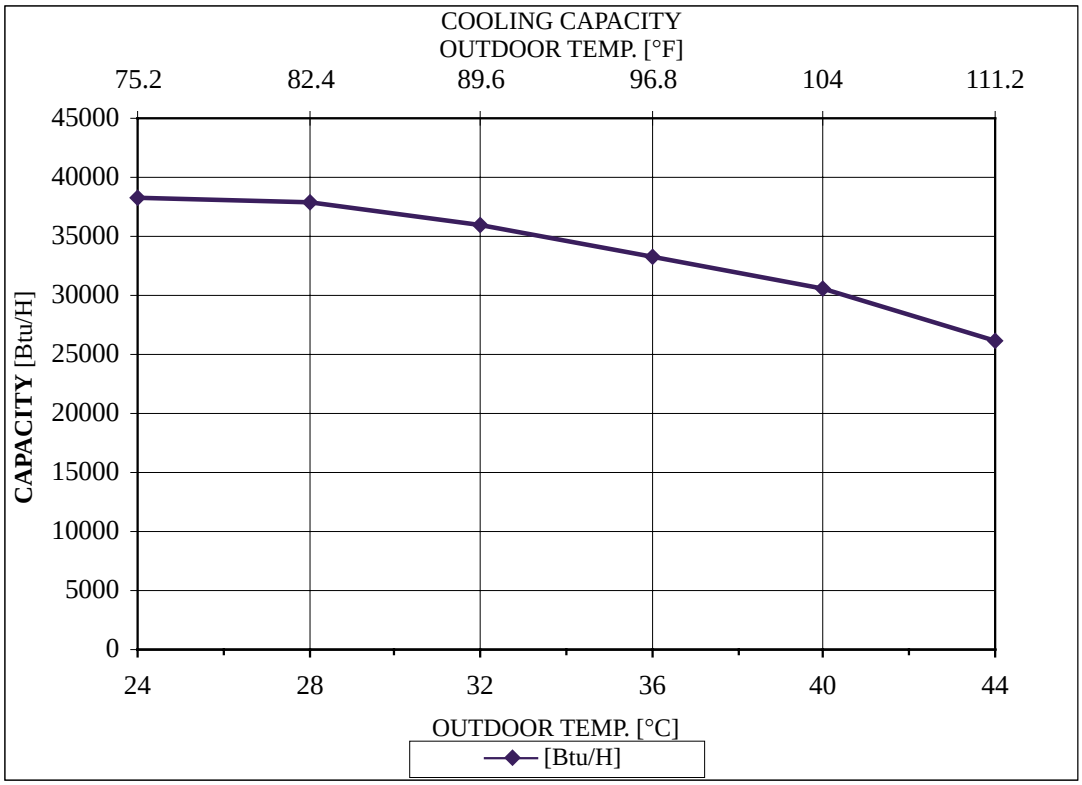


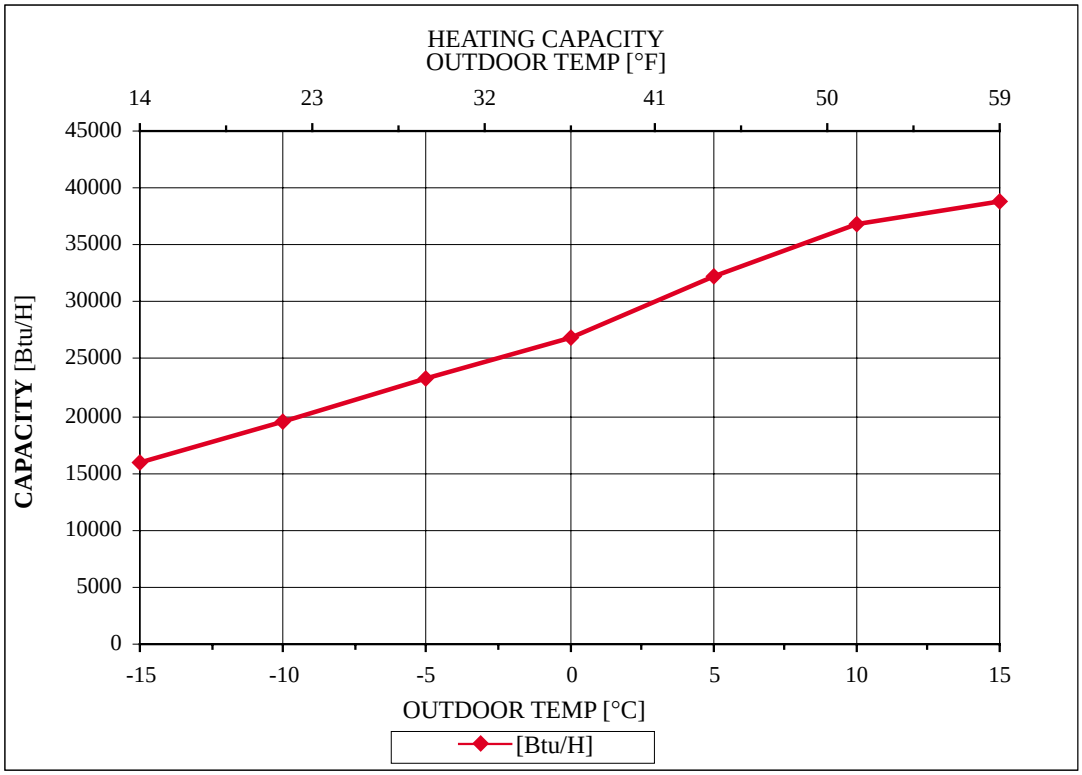


COOLING	
* OUTDOOR R.H. =	40%
INDOOR R.H. =	47%
INDOOR TEMP. =	27 °C
MAX. AIR SPEED:	TURBO

HEATING	
* OUTDOOR R.H. =	77%
INDOOR TEMP. =	20 °C
AIR SPEED:	TURBO

2.1.3 Cooling and Heating Capacity Curves CAL 36

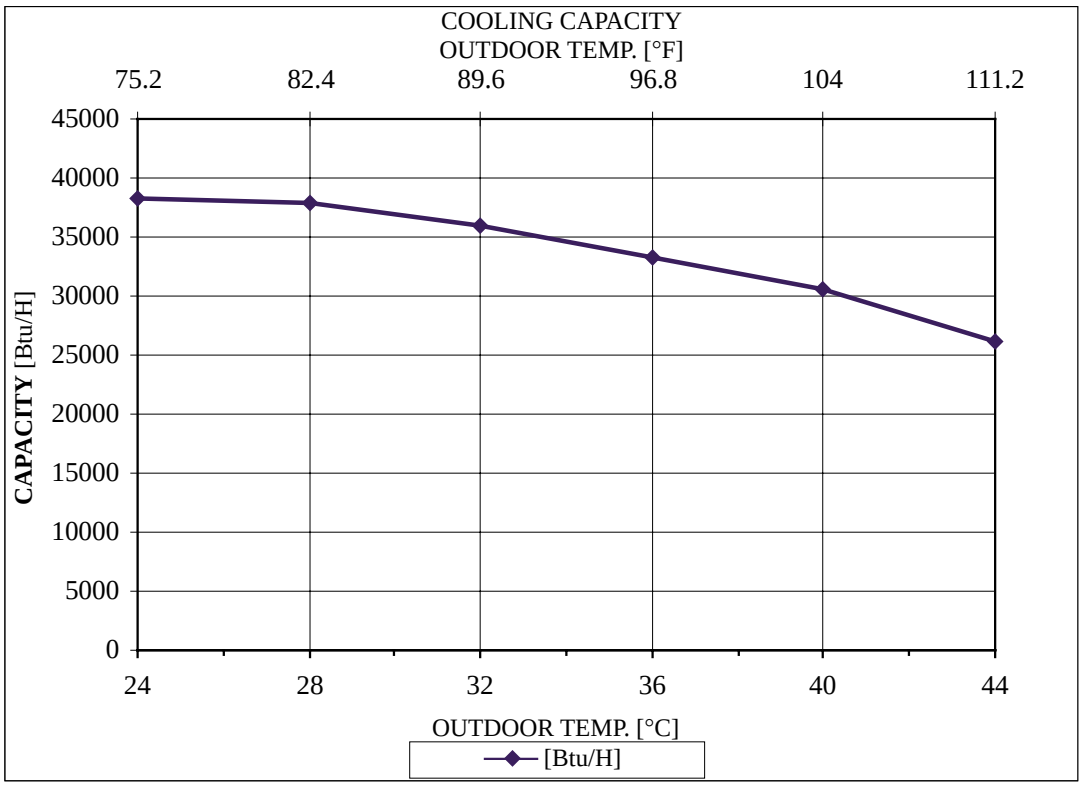


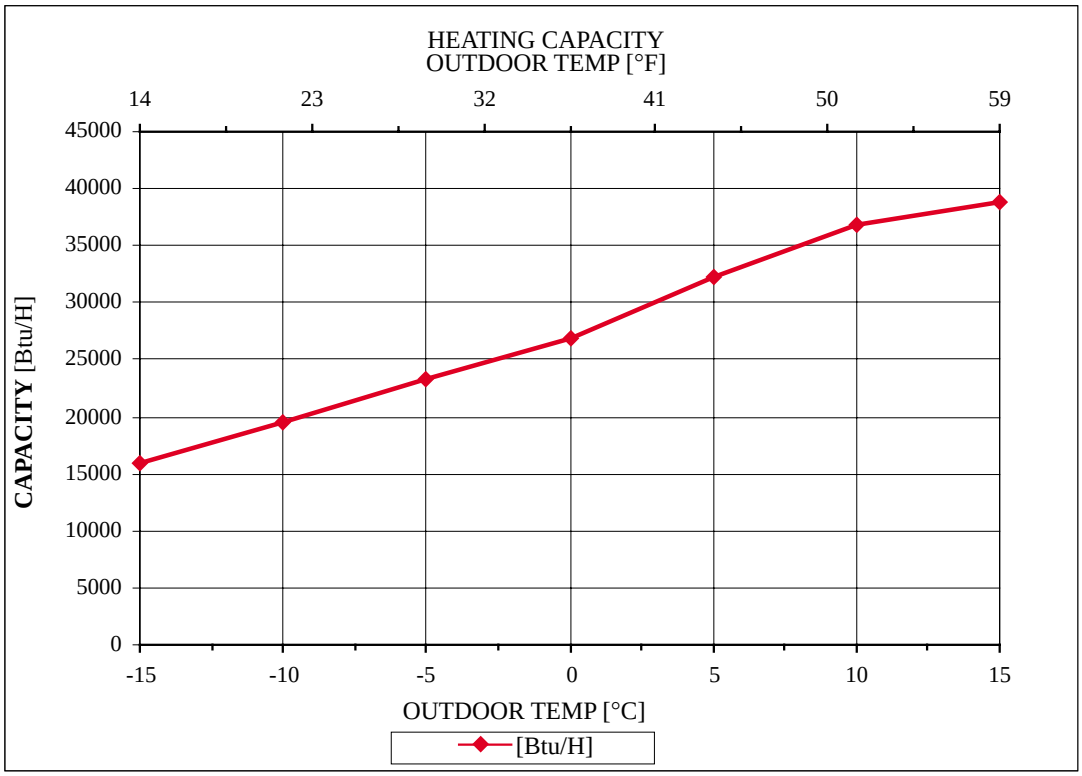


COOLING	
* OUTDOOR R.H. =	40%
INDOOR R.H. =	47%
INDOOR TEMP. =	27 °C
MAX. AIR SPEED:	TURBO

HEATING	
* OUTDOOR R.H. =	77%
INDOOR TEMP. =	20 °C
AIR SPEED:	TURBO

2.1.4 Cooling and Heating Capacity Curves CAL 363

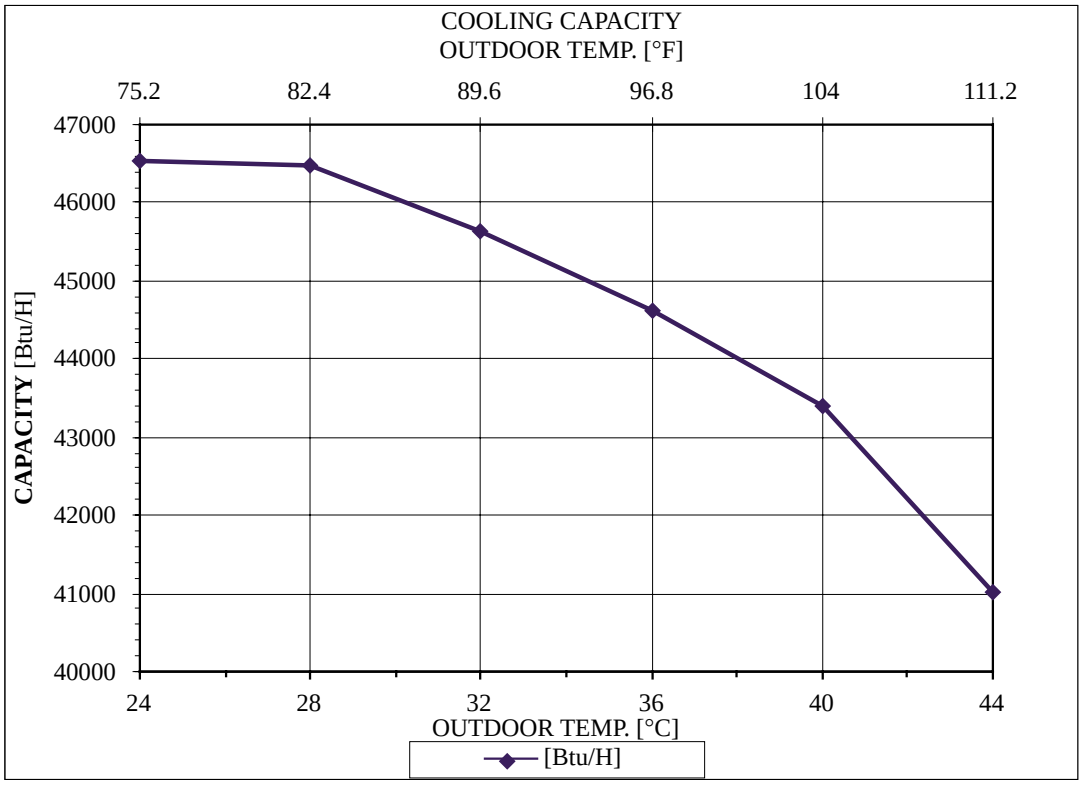


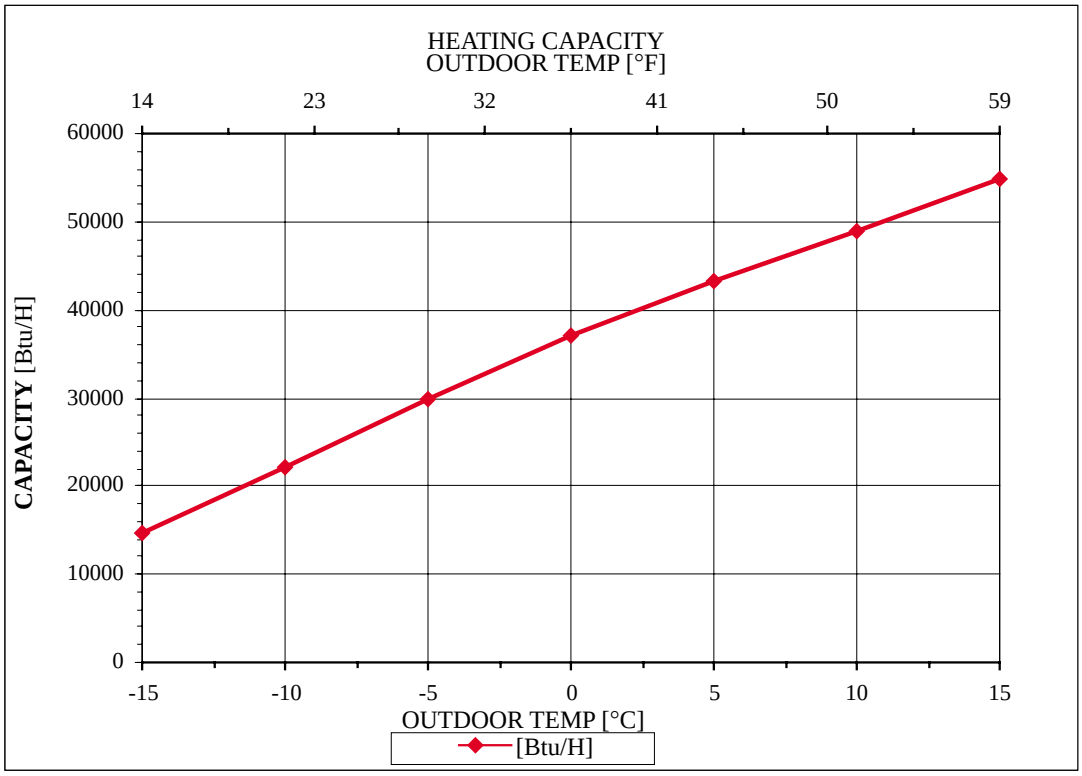


COOLING	
* OUTDOOR R.H. =	40%
INDOOR R.H. =	47%
INDOOR TEMP. =	27 °C
MAX. AIR SPEED:	TURBO

HEATING	
* OUTDOOR R.H. =	77%
INDOOR TEMP. =	20 °C
AIR SPEED:	TURBO

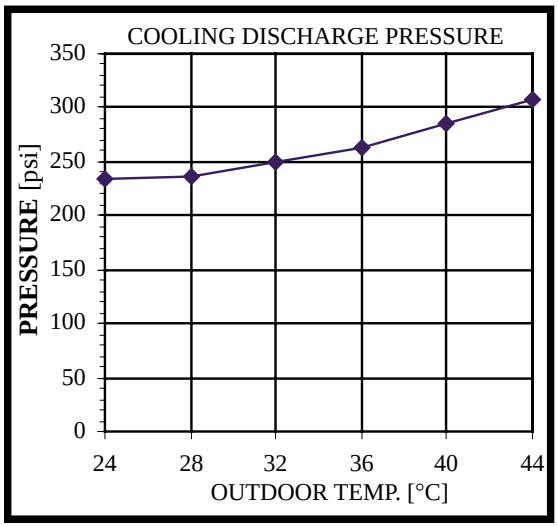
2.1.5 Cooling and Heating Capacity Curves CAL 483

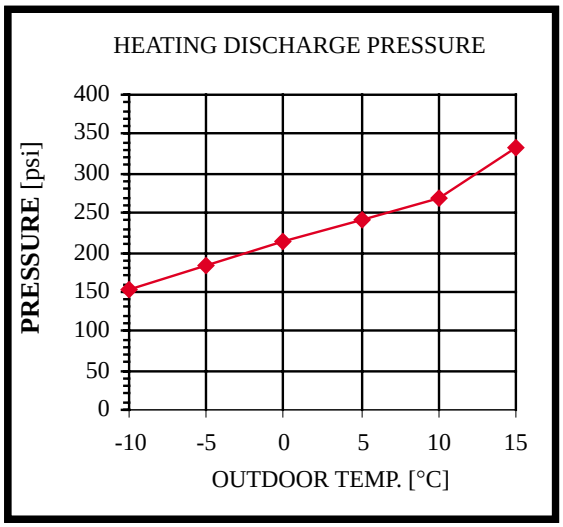


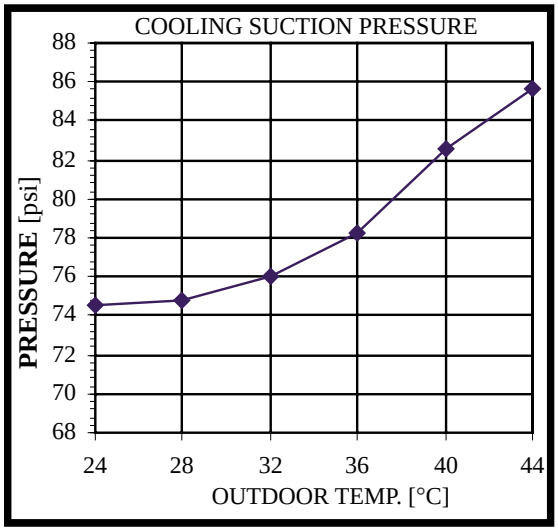


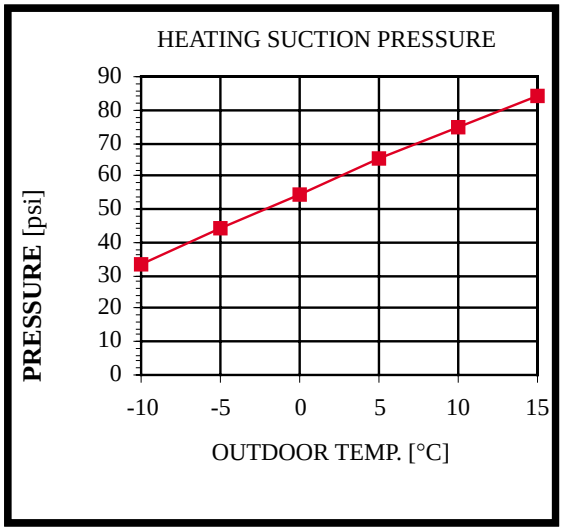
COOLING		HEATING	
* OUTDOOR R.H. =	40%	* OUTDOOR R.H. =	77%
INDOOR R.H. =	47%	INDOOR TEMP. =	20 °C
INDOOR TEMP. =	27 °C	AIR SPEED:	TURBO
MAX. AIR SPEED:	TURBO		

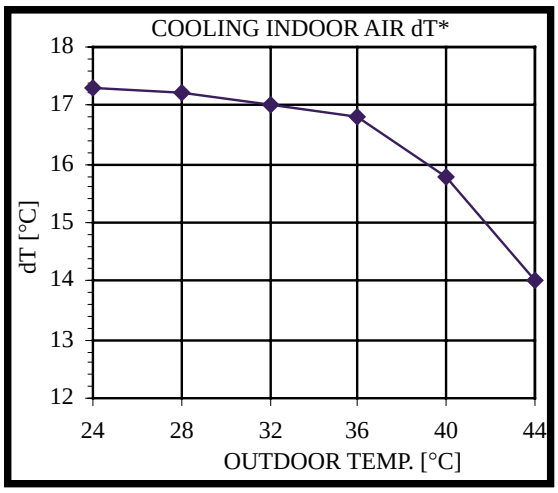
2.1.6 System Performance Charts CAL 18

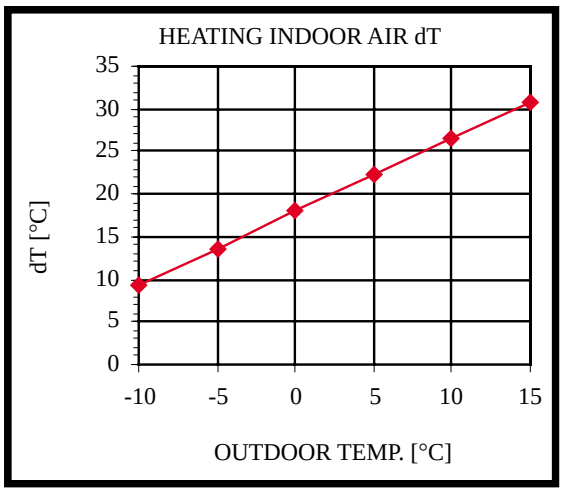








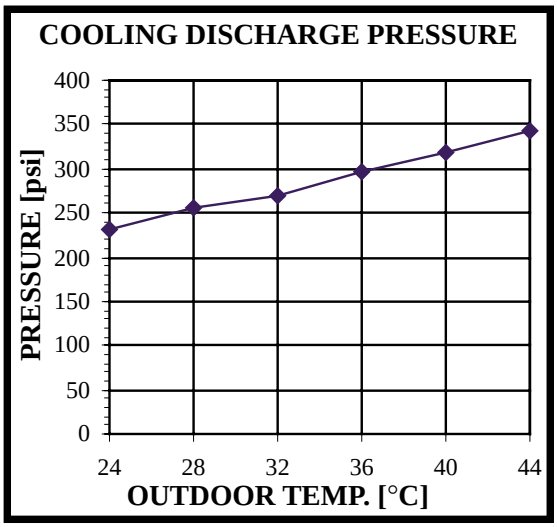


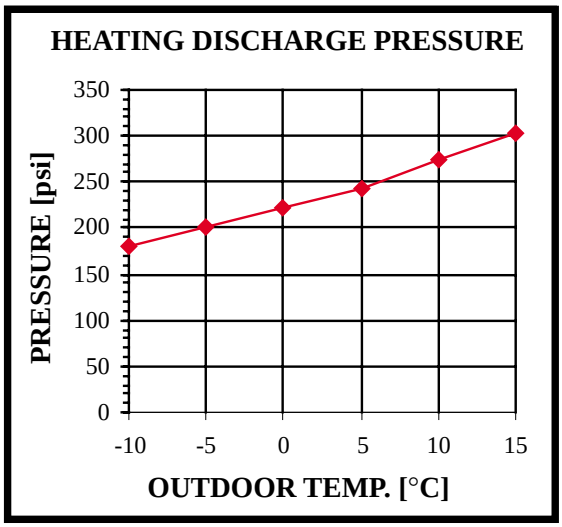


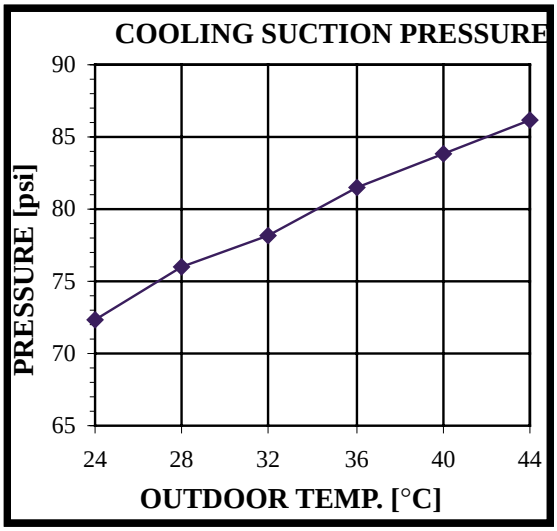
*** OUTDOOR R.H. = 40%**
INDOOR R.H. = 51%
INDOOR TEMP. = 80 °F
MAX. AIR SPEED: TURBO

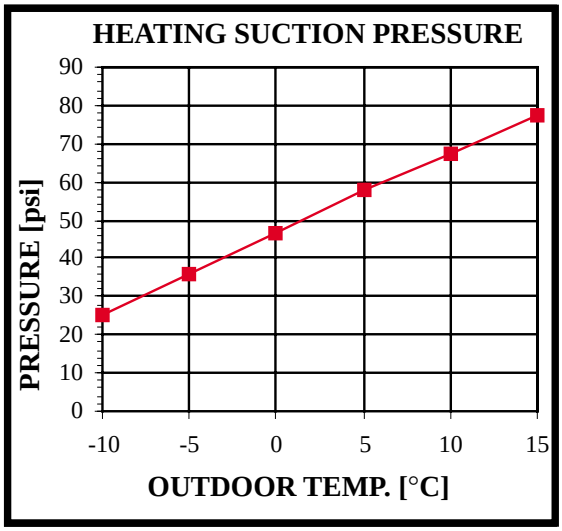
*** OUTDOOR R.H. = 70%**
INDOOR TEMP. = 70 °F
AIR SPEED: TURBO

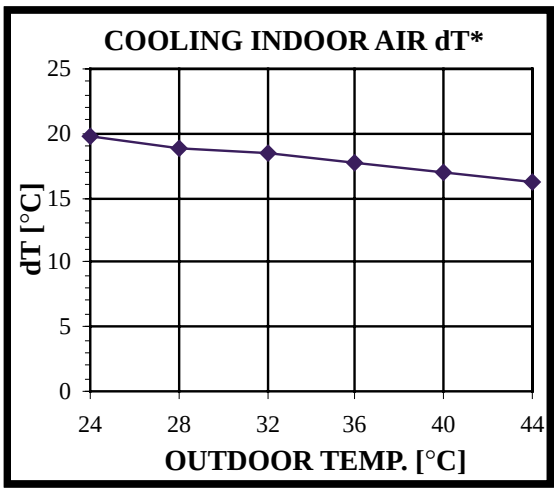
2.1.7 System Performance Charts CAL 24

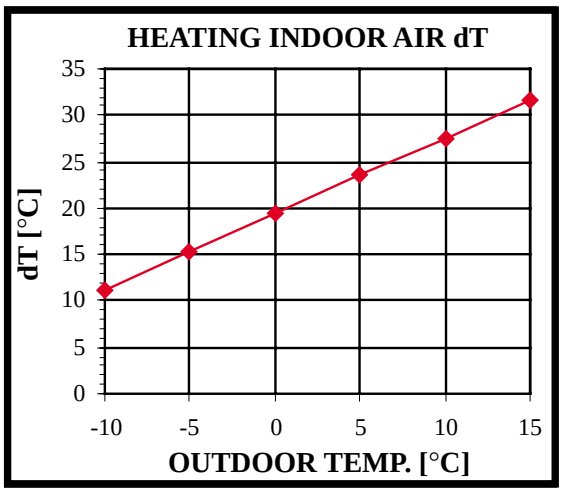








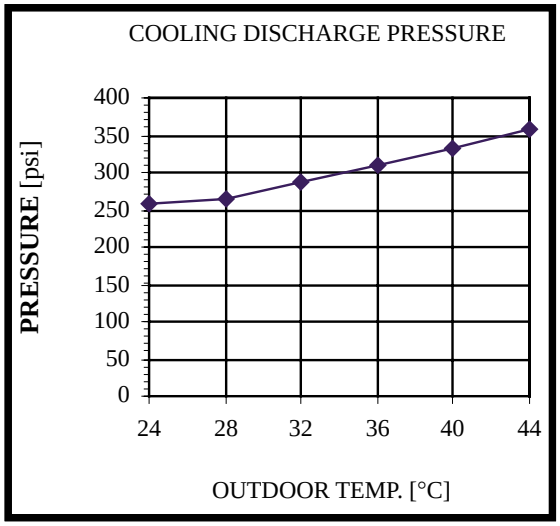


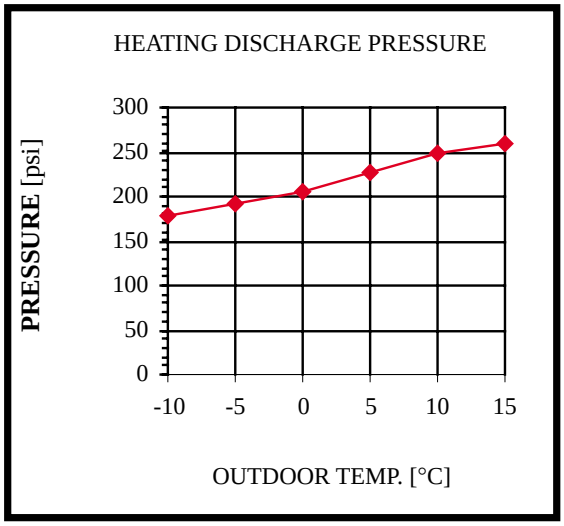


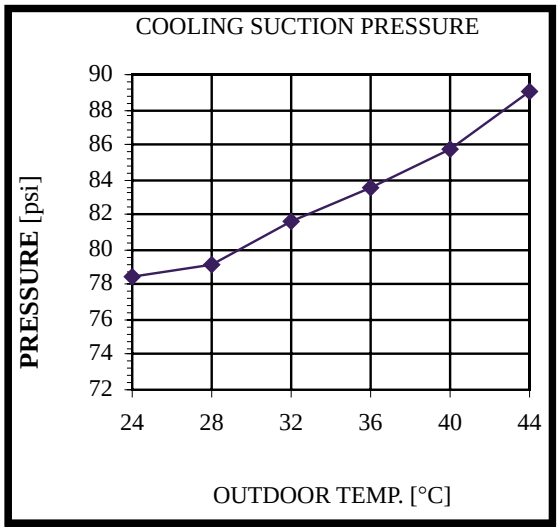
*** OUTDOOR R.H. = 40%**
INDOOR R.H. = 51%
INDOOR TEMP. = 80 °F
MAX. AIR SPEED: TURBO

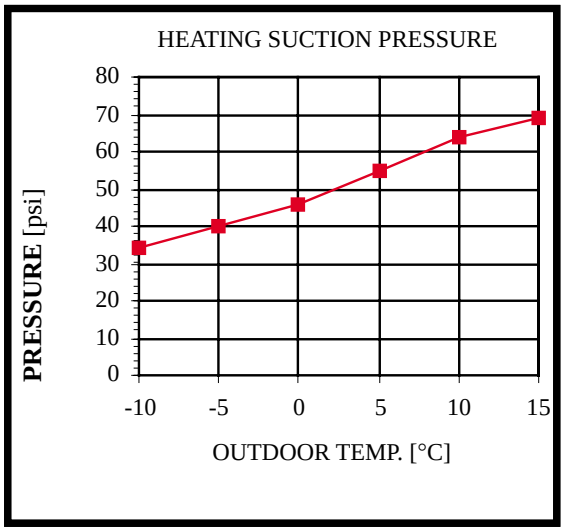
*** OUTDOOR R.H. = 70%**
INDOOR TEMP. = 70 °F
AIR SPEED: TURBO

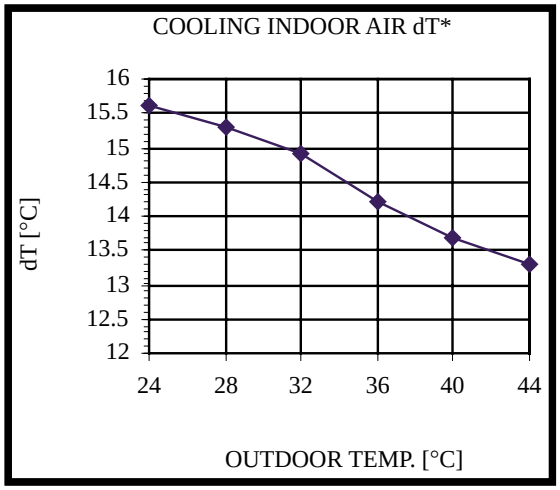
2.1.8 System Performance Charts CAL 36

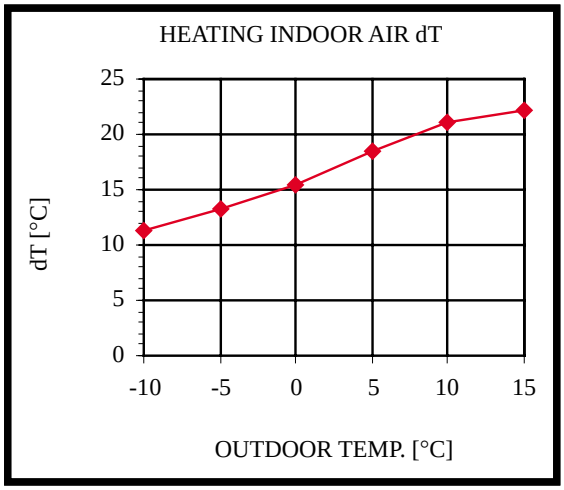








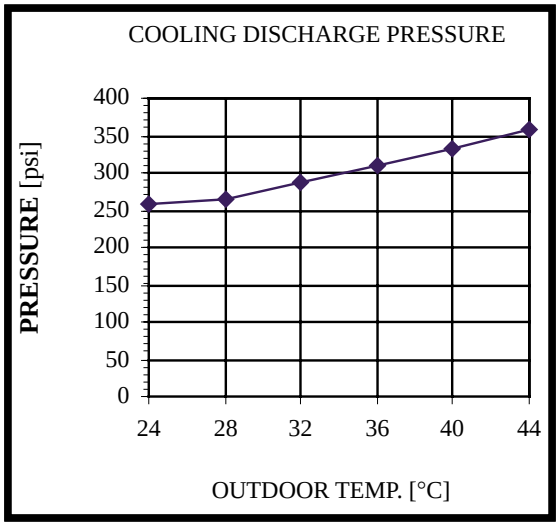


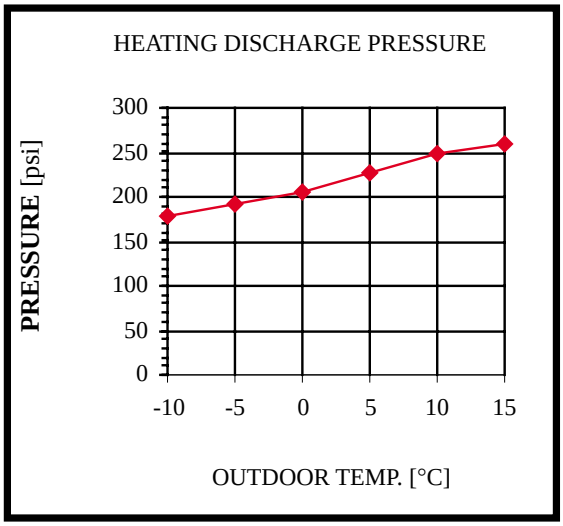


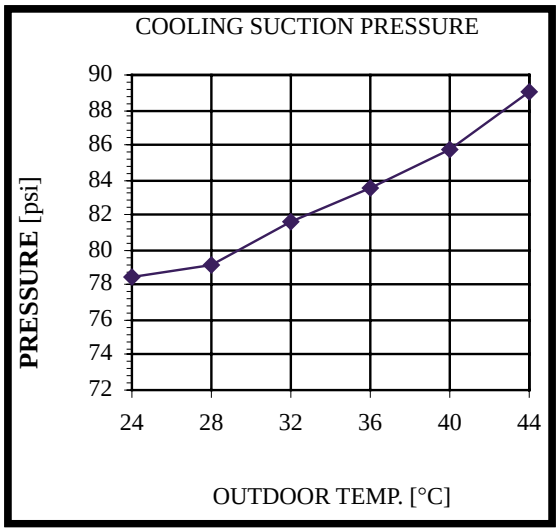
* OUTDOOR R.H. =	40%
INDOOR R.H. =	51%
INDOOR TEMP. =	80 °F
MAX. AIR SPEED:	TURBO

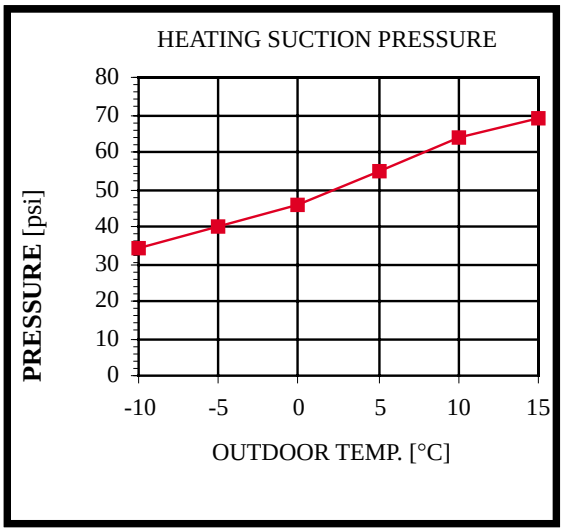
* OUTDOOR R.H. =	70%
INDOOR TEMP. =	70 °F
AIR SPEED:	TURBO

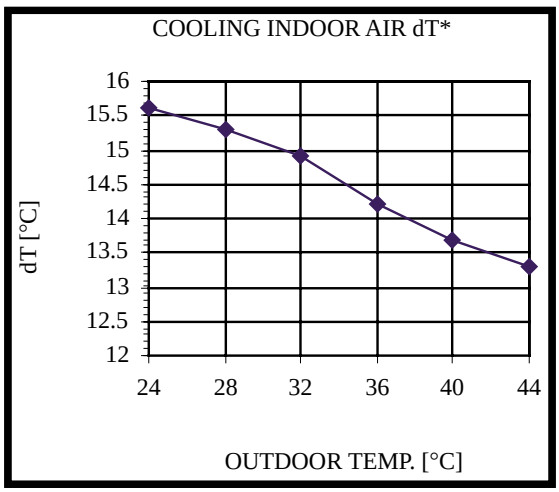
2.1.9 System Performance Charts CAL 363

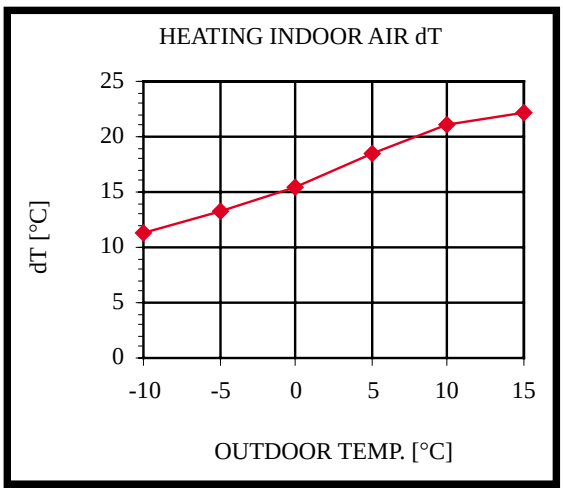








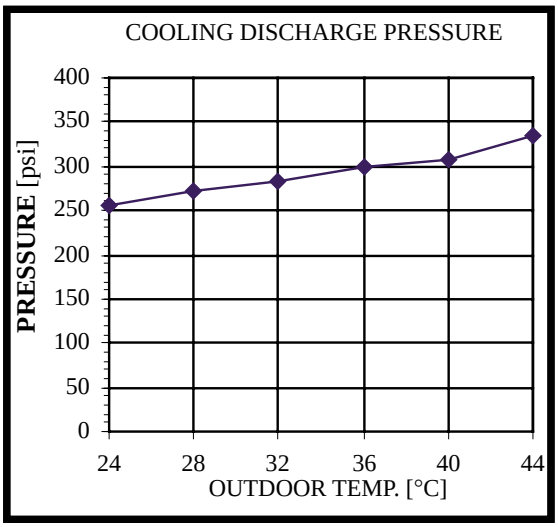


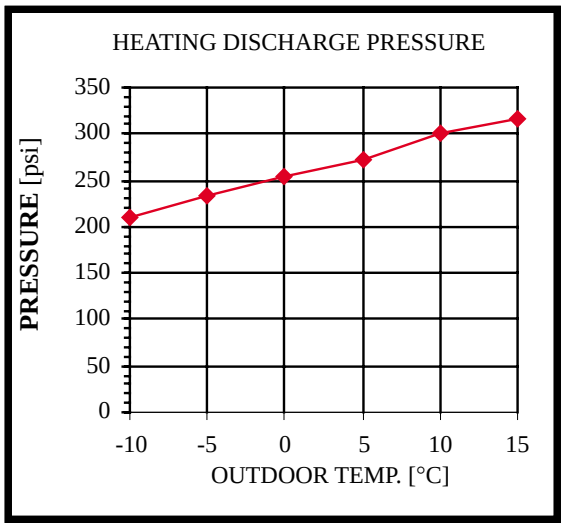


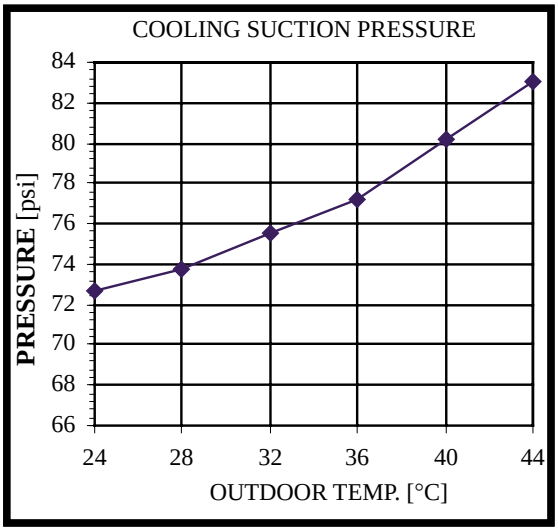
*** OUTDOOR R.H. = 40%**
INDOOR R.H. = 51%
INDOOR TEMP. = 80 °F
MAX. AIR SPEED: TURBO

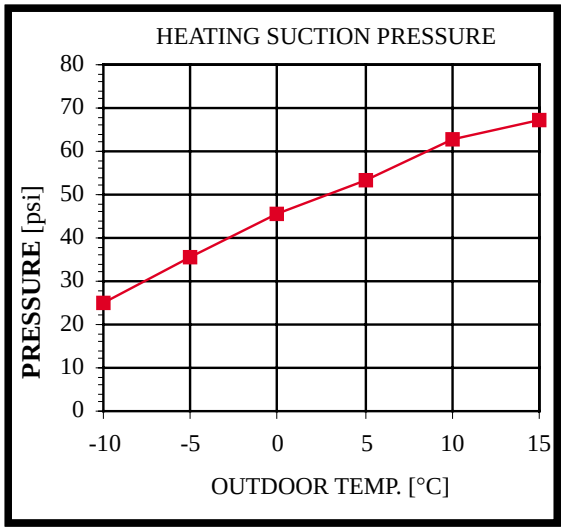
*** OUTDOOR R.H. = 70%**
INDOOR TEMP. = 70 °F
AIR SPEED: TURBO

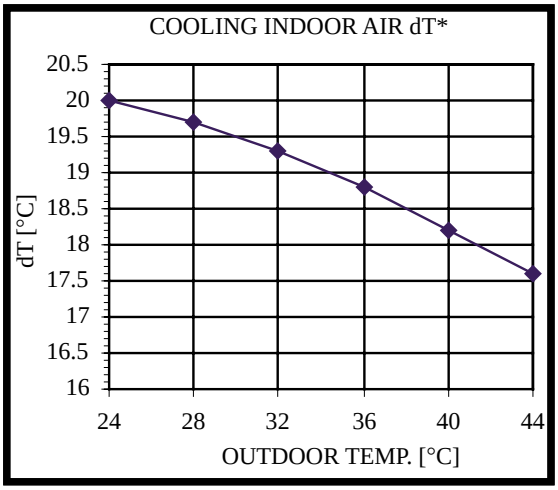
2.1.10 System Performance Charts CAL 483

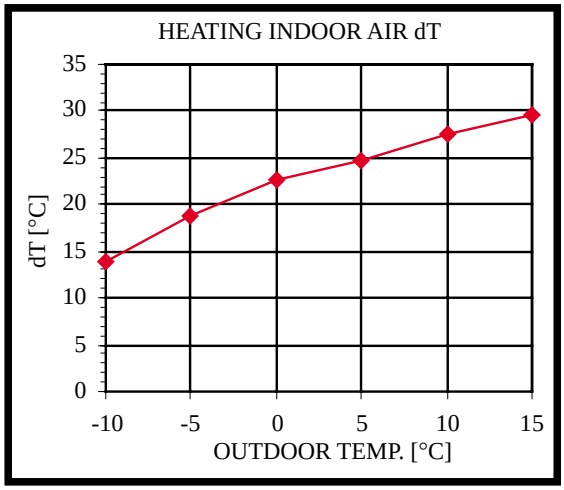










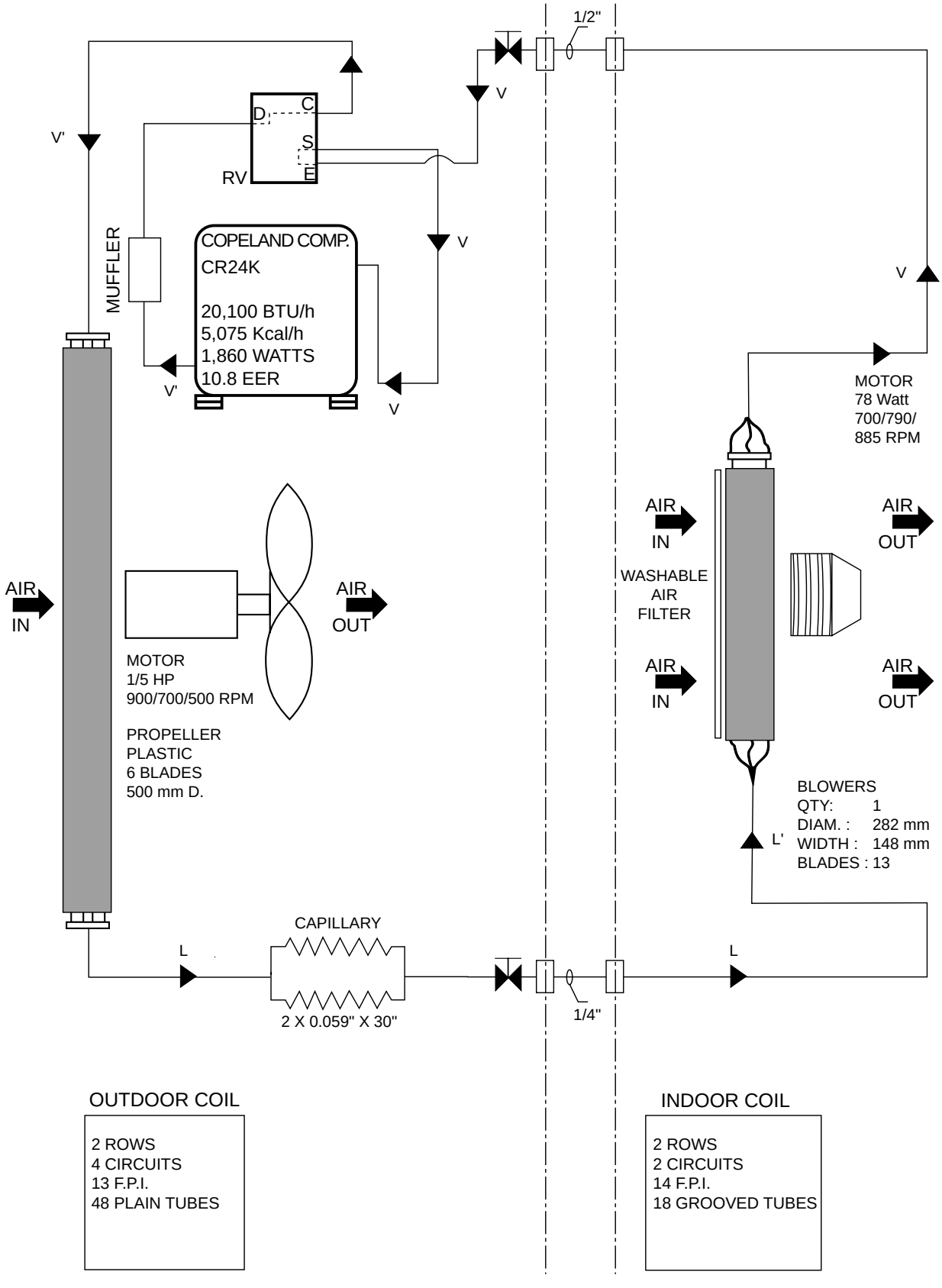


*** OUTDOOR R.H. = 40%**
INDOOR R.H. = 51%
INDOOR TEMP. = 80 °F
MAX. AIR SPEED: TURBO

*** OUTDOOR R.H. = 70%**
INDOOR TEMP. = 70 °F
AIR SPEED: TURBO

2.2 REFRIGERATION CYCLE

2.2.1 Refrigeration Cycle CAL 18



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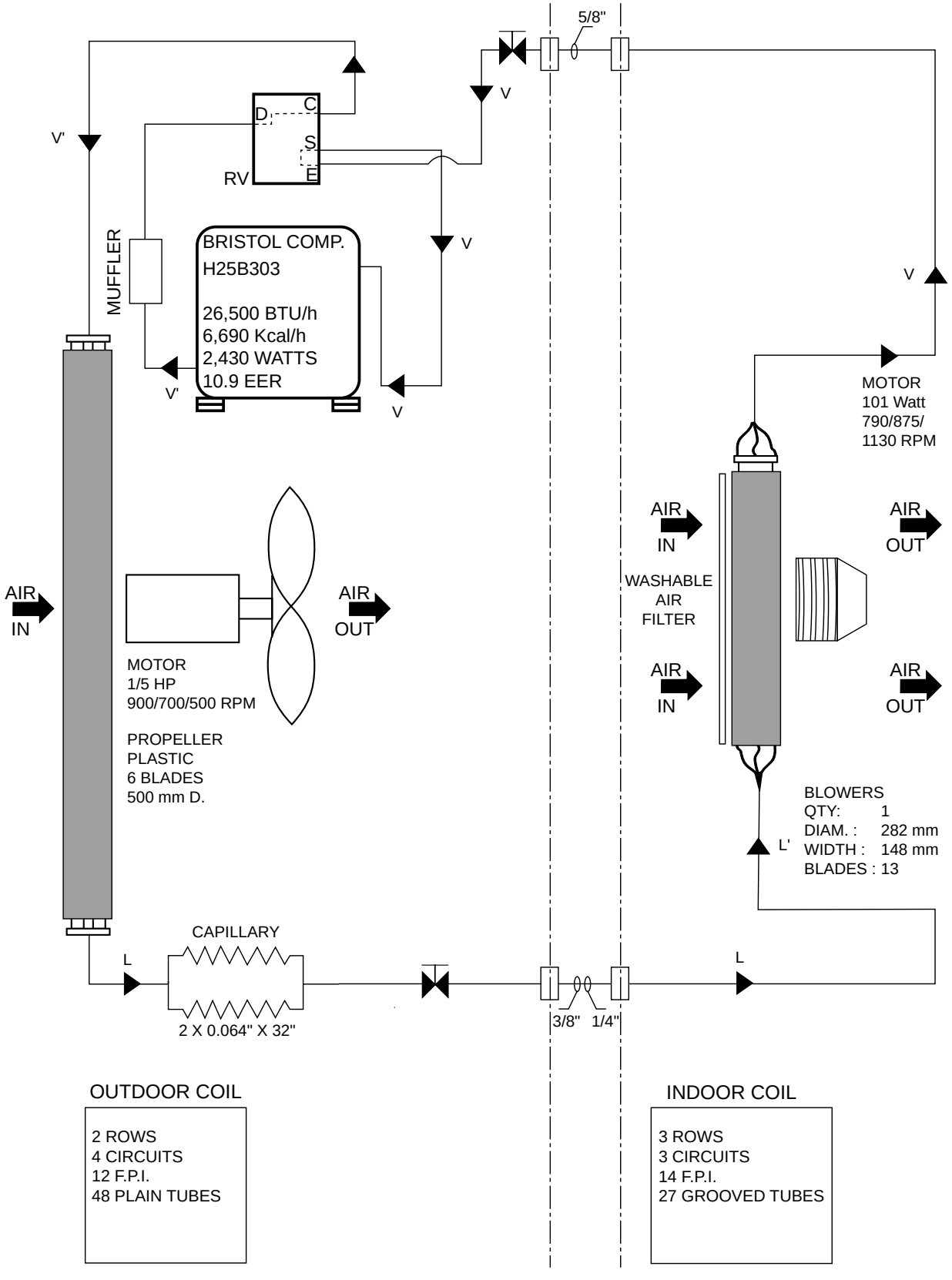
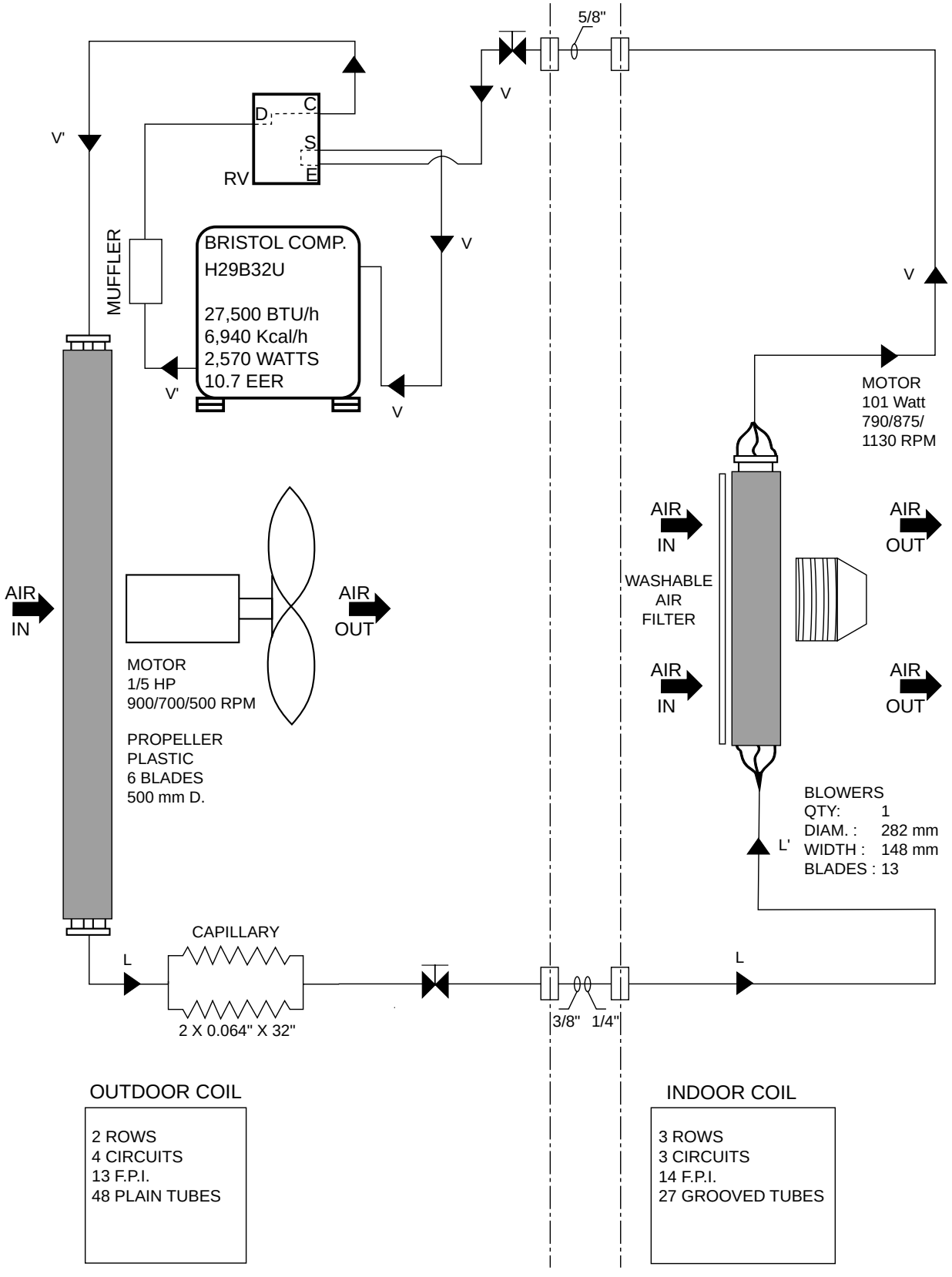
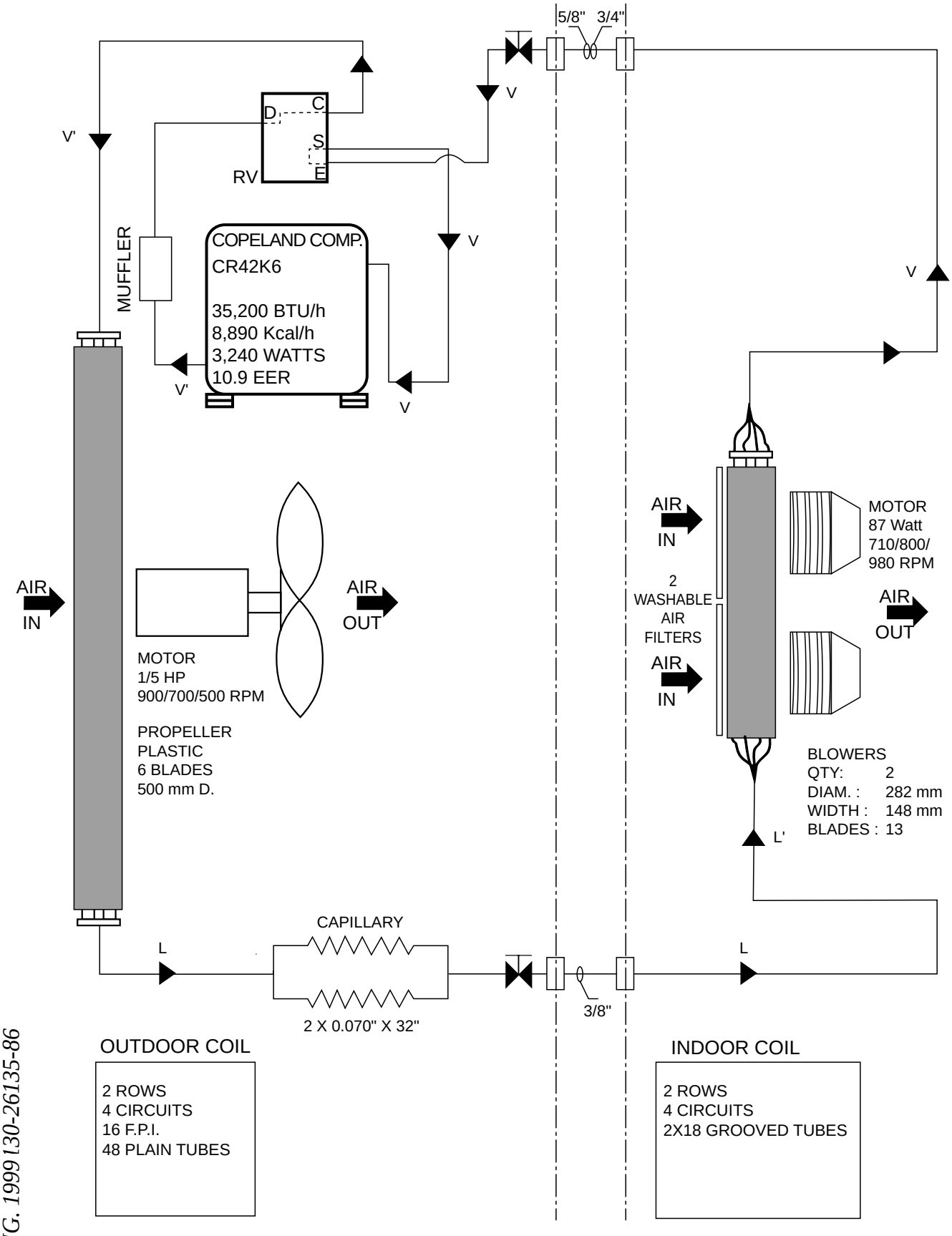
2.2.2 Refrigeration Cycle CAL 24



2.2.2.1 Refrigeration Cycle CAL 24 (Effective from S/N1149052338)



2.2.3 Refrigeration Cycle CAL 36



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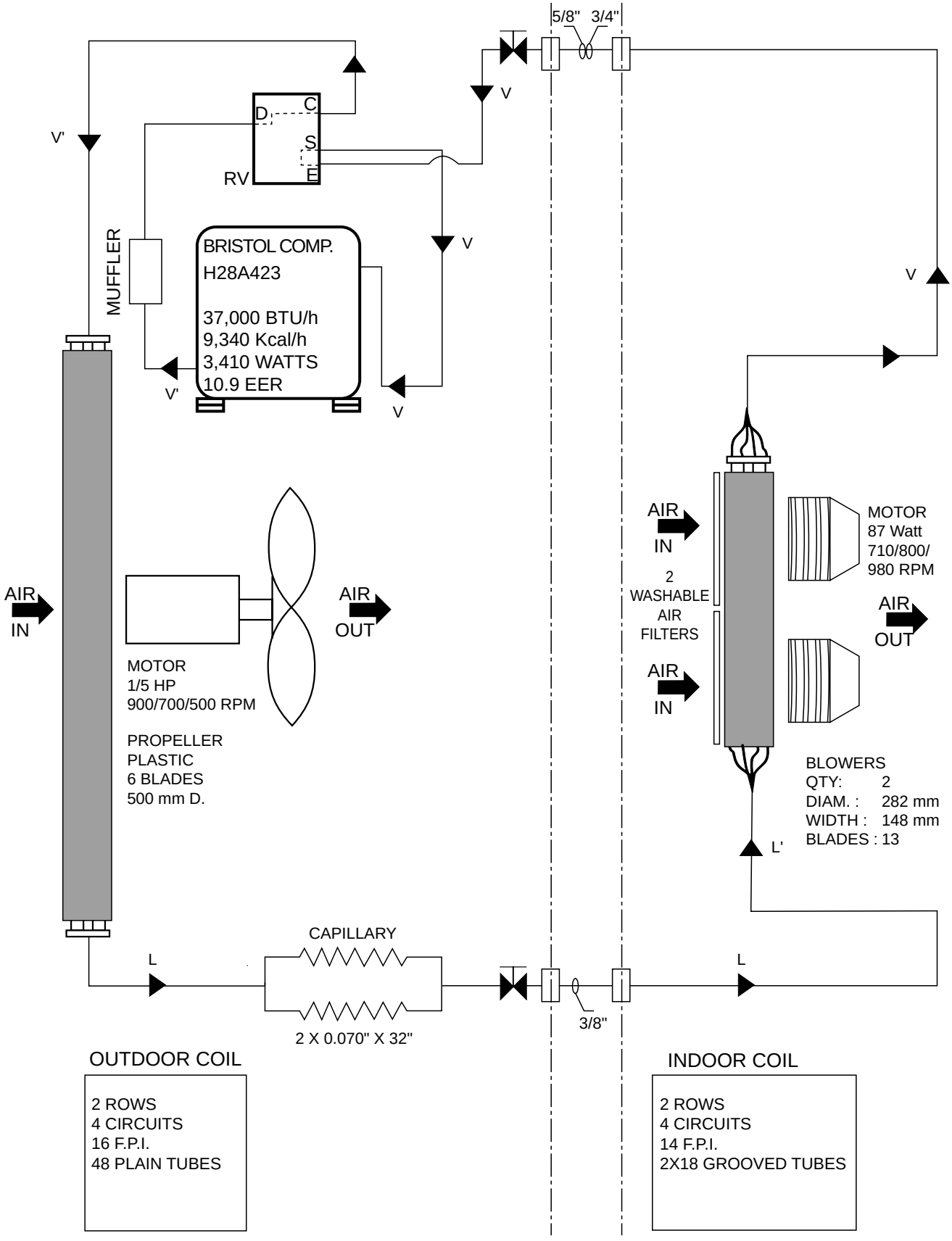
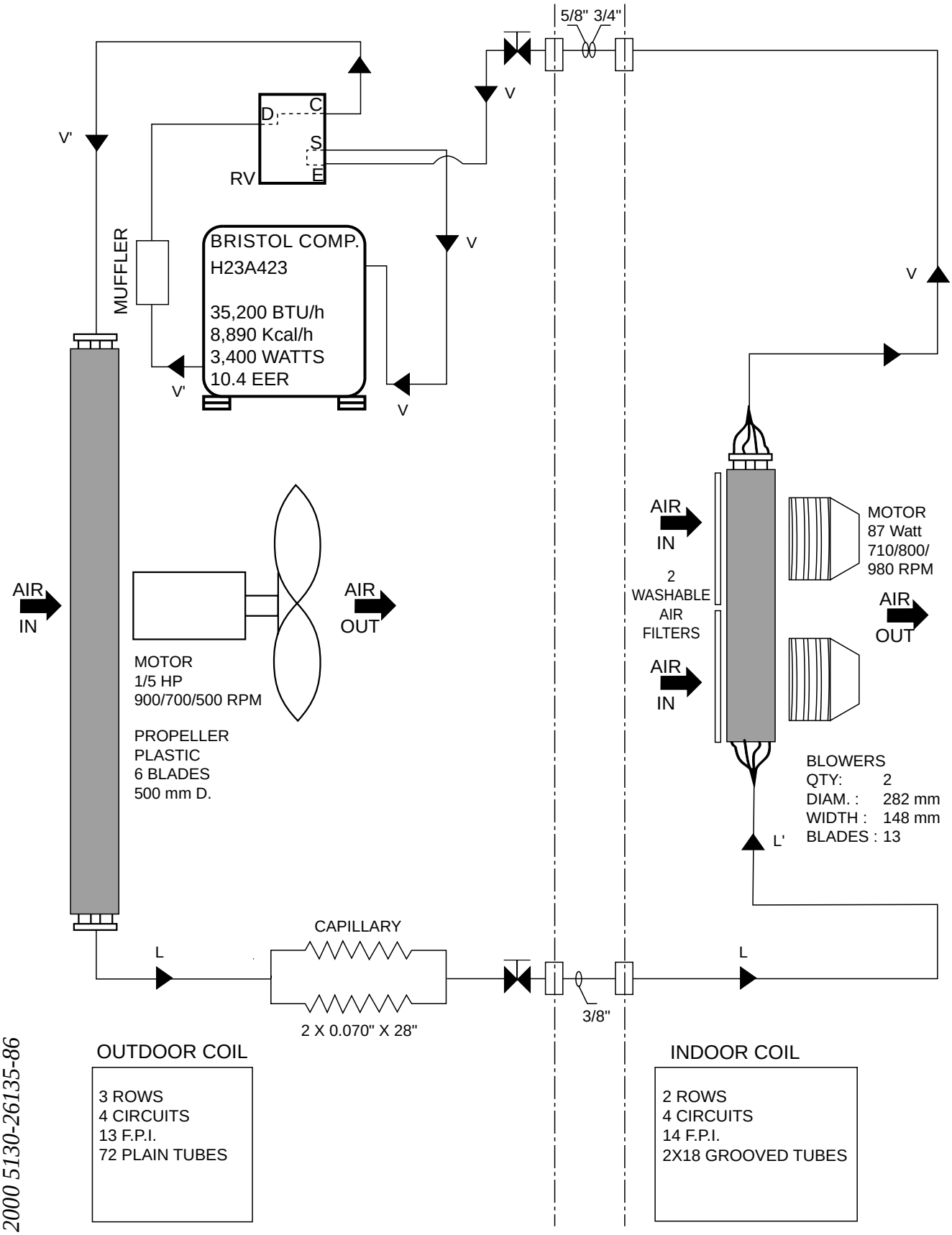
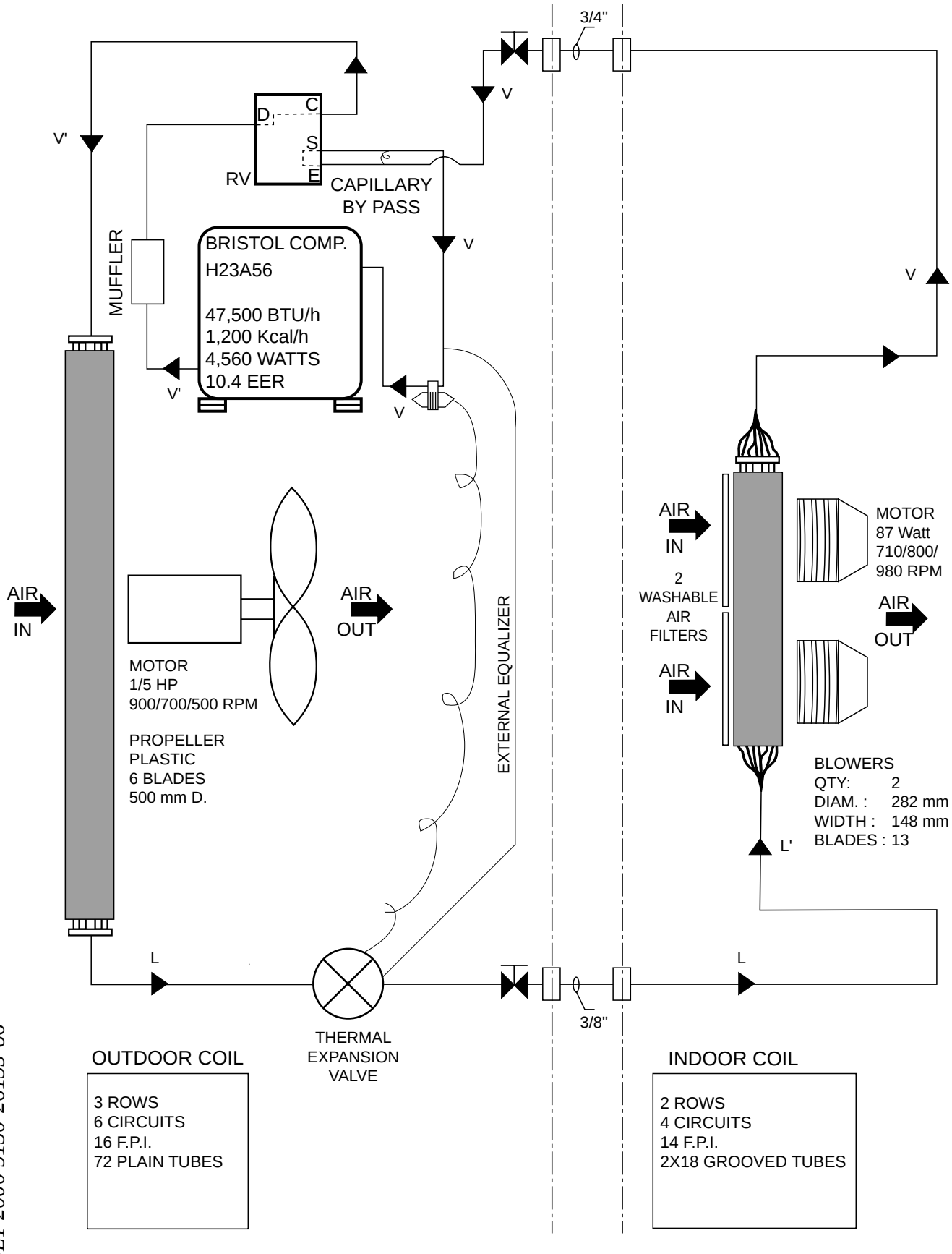


2.2.4 Refrigeration Cycle CAL 363



2.2.5 Refrigeration Cycle CAL 483



2.3 Cassette – Low Profile In-Ceiling Unit

The Cassette unit designed to be installed between the drop (false ceiling) and the main ceiling. The Cassette unit allows delivering high capacities without using metal or flexible ducts.

Cassette Advantages:

One. Improved air distribution (better than high wall or floor unit).

Two. Does not occupy wall or floor area.

Three. Option for fresh air (built in).

Four. Option for conditioned air supply to adjacent room (built in).

Five. The indoor unit designed to the size of (one or two) standard false ceiling panels.

Installation:

1. The Cassette evaporator must be installed in a level position.
2. Electrical connections are similar to the ANL-S connections, excluding the TH-1 & TH-2 sensors that are connected inside the evaporator on the blower orifice and the coil. Connect the TH-1 & TH-2 sensors to the electrical box.
3. Piping connections: the valves are fixed to the indoor unit allowing manipulation of the valves using a single wrench.
4. Evaporator adjustment: four, three or two air outlets available, according to the installation needs.

Tubing Adapters:

CAL-24:
The indoor fittings are 1/4" (discharge) and 5/8" (suction), while the outdoor fittings are 3/8" (discharge) and 5/8" (suction). With each outdoor unit, we supply inside the outdoor additional Fitting adapter 1/4" to 3/8" (Cat. No. 51305815790 - supplied with each condenser, no need to order). This Fitting Adapter must be installed on the condenser 1/4" discharge Fitting. The interconnecting refrigerant tubes are to be only 1/4" (discharge) and 5/8" (suction).

CAL-36:
The indoor fittings are 3/8" (discharge) and 3/4" (suction), while the outdoor fittings are 3/8" (discharge) and 5/8" (suction). With each outdoor unit, we supply inside the outdoor additional Fitting adapter 3/4" to 5/8" (Cat. No. 51305815780 - supplied with each condenser, no need to order). This Fitting Adapter must be installed on the condenser 3/4" suction Fitting. The interconnecting refrigerant tubes are to be only 3/8" (discharge) and 3/4" (suction).

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Replacing the TH-1 (return/intake air) sensor

During TH-1 replacement, removal of the intake grill is required (turn the plastic screws 90°). Then, totally remove the front cover by unscrewing the screws on the intake grill corners and also remove the drain pan.

Replacing the TH-2 (indoor coil temperature) sensor

Begin with the procedures as in the replacement of TH-1 sensor. Remove the drain pan by unscrewing the (4 or 6) screws that connect the drain pan to the evaporator body.

Replacing Indoor Fan Motor Capacitor

Begin with the procedures as in the replacement of TH-1 sensor. Remove the orifice (intake assembly) from the drain pan by unscrewing 2 screws. Remove the blower wheel by unscrewing its central (holding) screw. Now the capacitor can easily be replaced.

Replacing Indoor Fan Motor

Begin with the procedures as in the replacement of indoor fan motor capacitor. Disconnect the motor electrical harness. Replace the fan motor.

Replacing Drain Pump

Begin with the procedures as in the replacement of TH-2 sensor. Remove the blower wheel. Unscrew 2 screws that attaches the drain pump.

Replacing Safety Level Switch

Begin with the procedures as in the replacement of TH-2 sensor and unscrew the screws that attach the safety level switch. Finally, disconnect the safety level switch electrical harness.

Replacing Indoor Coil

Begin with the procedures as in the replacement of the drain pump. Remove both coil supports (2 screws) and unscrew the single screw that attaches the coil to the evaporator back. In addition, the following components must be removed before removing the indoor coil: fittings (6 screws), drain pump, safety level switch and TH-2 sensor.

Cassette Drain Pump Water Elevation

Water elevation is 300 mm from false ceiling.
The drain pipe cannot go higher than 300 mm because of the risk of water return from the pipe, when the unit stops (back flow) which could overflow the drain pan!

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Specification for the Water (Drain) Pump Control

Water (Drain) Pump specifications

Operation Life:	15 years or 15,000 hours.
Power Supply:	230V±10% - 1ph - 50Hz.
Motor Type:	Single phase 2 poles.
Operating temperature:	0 - 40°C.
Operating humidity:	Maximum 95%.
Working fluid:	Water condensation at 5°C min.
Height difference:	See the installation instructions of the unit.

The Water Pump control is designed to control the water pump in the Cassette (CAL) type air conditioners.
The Water Pump control operates the water pump with the TAC-404 Electronic Control Family.
The Water Pump control is connected between the Main (TAC-444) and the Display Assy (TAC-460) in series.
The main task of the water pump is to prevent a water flood whenever the air conditioner unit is in Cool mode or when switching to Off mode after Cool mode.
The basic algorithm is that the water pump will work whenever the air conditioner is in cool mode and for the next 5 min. after the compressor is turned to Off in Cool Mode.

Mechanical design:

The water pump is designed to fit into the electric control box of the Cassette air conditioner.
The PCB is attached to the electronic control box by four “snaps”. The “snaps” are placed on the four PCB corners (4mm hole).
The Control is connected to the Main Board (TAC-444) and the Display Assy (TAC-460) via an RJ11 connector.
The Control is connected to the Safety Level Switch (flood sensor) via two 6.3mm terminals.
The Control is connected to the water pump via two 4.7mm terminals.
The control is connected to 230Vac power supply via a two terminal block.

Electrical design:

The pump control is powered by the TAC-444 main unit with a 10-18Vdc unregulated power supply.
The pump control “reads” the communication line using the Current loop method.

Inputs:

Item	Description	Operation	Designation
1.	Main – Control communication	Connects between the Main control unit (TAC-444) and the Pump Control.	Con1.
2.	Control – Display Communication	Connects between the Pump control and the Display (TAC-460).	Con2.
3.	Safety Level Switch (flood sensor)	Signals the unit in case the drain has overflowed.	Con3.
4.	Power	15V Unregulated DC 50mA.	Via Con1.
5.	Communication	20mA Current loop method.	Via Con1.

Output:

Item	Description	Operation	Designation
1.	Pump Control	220Vac 1A N/O Control	Con.4

Performance:

The Pump Control uses the 20mA current loop method or the Open Collector method to **monitor** the communication between the TAC-444 – Main Unit & the TAC-460 Display.

Normal operation:

The Pump Control drives the Water Pump in the following conditions:

- When the A/C is in Cool mode (Reverse Valve off) and the compressor is activated.
- The Water Pump works continuously, as long as the compressor works, in cooling mode.
- The Water Pump will work for additional 5min. after any compressor stops (in Cool mode).
- Immediately when the safety level switch (flood sensor) indicates overflow.
  When the floating sensor indicates overflow and turns the compressor off (temporary or total system halt) the Water Pump will work for additional 5min.
- After entering the Rest Loop (thermostat stop), the Water Pump will work for additional 5min.
- After a system operation halt (failure), the Water Pump will work for additional 5min.
- When switching from Cool to Heat mode, the Water Pump will work for additional 5min.
- In Heat mode, the water pump is always switched off.

Recovery from power failures:

The Pump-Control will activate the water pump for 5 min. each time after power recovery if the previous mode was Cool mode.

Emergency operation:

When the Pump Control detects a water overflow, by the safety level switch, it stops the communication between the TAC-444 - Main unit and the TAC-460 – Display. As mentioned above, the Pump-Control is connected in series between the TAC-444 and the TAC-460. The Pump-Control stops all commination simply by disconnecting the Display from the Main. This will cause the POWER indication light to flash (as in “normal” communication failure).
During that time the Pump Control will activate the Water Pump as long as needed. The Pump Control will reactivate the communication when the overflow sensor is switched off. In case the overflow situation is repeated 3 times during a period of 30min., the Pump-Control will disable the operation of the A/C (total system halt), by disconnecting the communication, until a power reset. Otherwise, the Pump Control will begin the counting again. Recovery from the total system halt is done by sending Off to the system and then re-entry to On by mean of the 3-position slide switch (on the Display Assy).
In case the safety level switch continuously signals fault (for a long time period), the Pump Control will disconnect the communication, until the water level drops to normal.

Water (Drain) Pump Troubleshooting Chart

Warning: Always unplug the A/C before performing cleaning or maintenance activities.

	Symptom	Probable Cause	Corrective Action
1	Constant overflow.	1. Faulty Safety Level Switch. 2. Stuck Safety Level Switch. 3. Safety Level Switch is disconnected. 4. Disconnected Water Pump communication cable. 5. Totally clogged drainage.	1. Replace Safety Level Switch. 2. Remove obstruction or replace Safety Level Switch. 3. Connect the Safety Level Switch. 4. Connect the Water Pump. 5. Remove obstruction and clean the drain pan.
2	Cyclic overflow (three times during 30 min.)	Partial blockages near the water pump that cause low handling capacity of the water pump.	Remove obstruction and clean the drain pan. Clean also the area near the water pump and the water pump filter.
3	Temporary overflow.	Any reason from the above mentioned. This can also be a normal situation due to very high humidity levels that can cause high water flow.	See all the above mentioned.

Note: flashing of the POWER indication light will indicate all types of overflow failures!

Generally, water leaks can be caused due to ice formation at the bottom of the evaporator coil, due to lack of refrigerant (for example). When the evaporator enters the De-Ice procedure, the melted ice leaks from the drain pan.

Important Note: remember that the condensed humidity must be pumped out of the drain pan after the unit is switched off. You must not turn the unit off by cutting out the main power supply. If the unit will be switched off via the power supply, the water pump will not operate for additional 5min. as required to remove the accumulated water, so a water leak can occur!

Air Distribution:

Circulating the room air significantly reduces the temperature differences in the conditioned room. Circulation of the air is achieved by central air suction and the four directional louvers. The louvers are controlled (only) manually. If necessary, up to two louvers can be in a closed position, preventing air outlet to the specific direction that the closed louvers are facing.

In Cassette models, there is high significance to the louver position in Cool and Heat modes. In Heat mode, it is strongly recommended that one or two louvers be closed to increase the air speed and the airflow downwards, especially in very high ceiling installations.
Note: maximum of two louvers allowed to be closed for all units (see also: “Minimum clearances” at the Installation instructions).

Conditioned Air Supply to an Adjacent Room:

Option for delivering conditioned air to adjacent room via additional ducts is available in all models. One knockout exists in CALI-28-24 models or two knockouts in CALI-36-48 models. The knockouts are on one side only. Take this into consideration before positioning the indoor (evaporator) unit! Insulation of this duct is unnecessary **only** if it is routed via conditioned space (no humidity).

Important Note: the maximal length of the duct should not exceed 3 meters. Beyond 3 meters, the airflow to the adjacent room will be insufficient.

Also note:

- A return air path must be provided in case the conditioned air to the adjacent room option is being used.
  The return air path can be simply leaving the door open, installing a grill at the bottom of the door or an undercut at the bottom of the door. In the last option, consideration should be taken for the heat load in the space between the two conditioned rooms.

- Close the louver facing the adjacent room, to improve the airflow in the duct.

- Before connecting the ducts to the adjacent room (or rooms), verify that the unit capacity fits the heat load to be accepted from the adjacent room (or rooms).

When the Cassette unit is installed over false ceiling, there is the possibility using one large unit (CALI 36 or CALI-48) for two rooms. In this case, locate the unit half in each room. It is possible **only** if the common wall thickness does not exceed 10 cm. In this case, no return air from the next room is needed.

See also “Conditioned air supply to an adjacent room” in the Installation Procedure.

Fresh Air Renewal:

Connection to a 4” fresh air inlet duct option is available in all Cassette models. The fresh air intake knockout is located near the conditioned air to the adjacent room duct knockout. For all models, option for only one duct is available. This duct does not require any insulation.
Fresh air create positive pressure in the room, preventing external air entrance via any openings in the room and by that improves the air quality in the room.

Important Note: in simple installations, the fresh air supply should not exceed 10% of the total airflow to prevent excessive heat load on the unit. Otherwise, a primary air treatment system with separate deflectors is recommended.

Note: the fresh air knockout panel is located beside the blower intake. For fresh air ducts up to 2 meters, the air suction is performed by the unit’s blower suction power. Whenever the duct is longer than 2 meters, a supplementary fan motor should be added. Do not connect the supplementary fan motor to the Electronic Control supply. The supplementary fan motor should be powered only by a separate power supply in order to stop the fresh air supply in case of high outdoor temperature, and so on.

See also “Fresh air renewal” in the Installation Procedure.

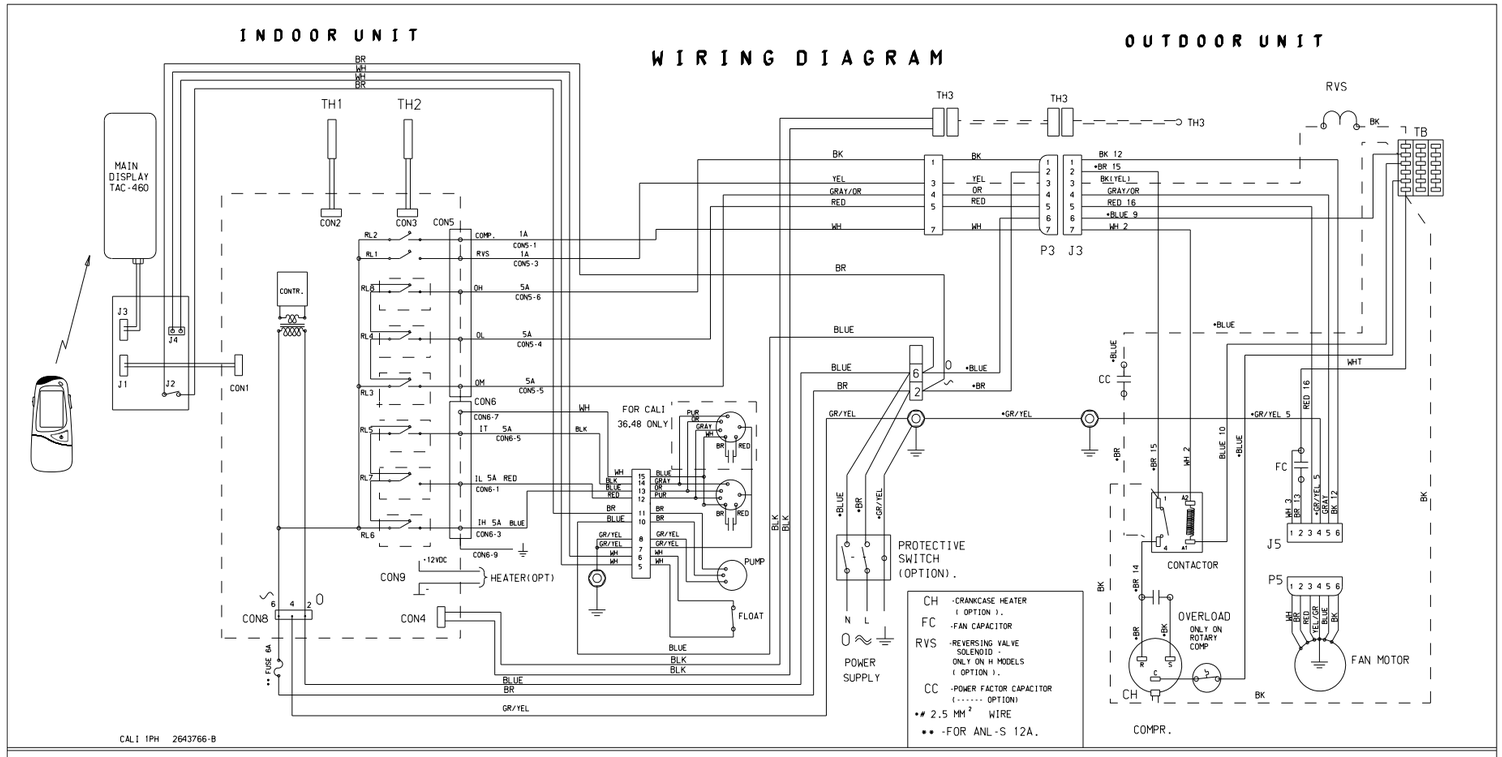
Bill Of Material (BOM) – Water Pump for CAL (Cassette)

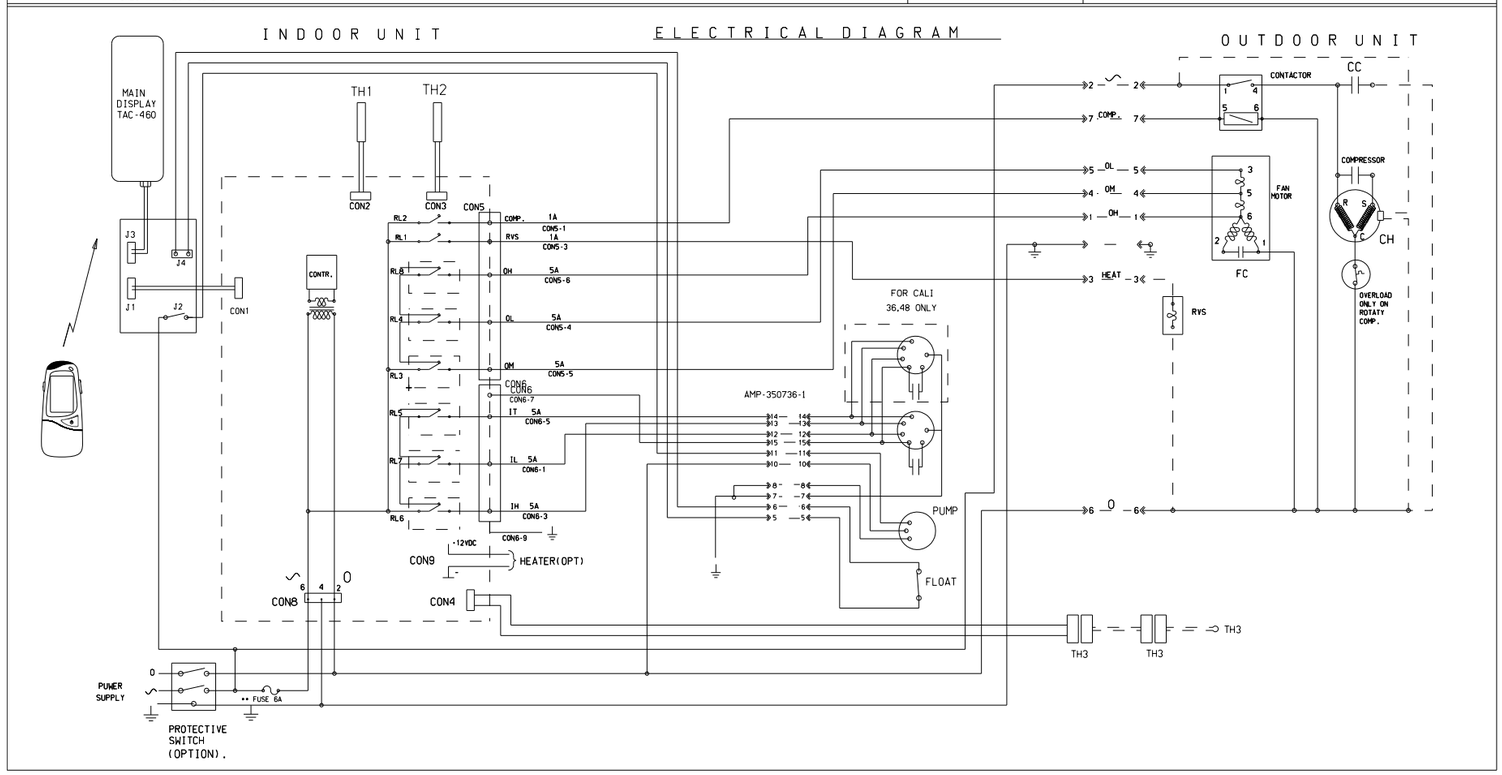
No.	Item	Specification	Package	Qty.	Manufacturer	Reference
1.	CAPACITOR	47µF 16V	SSL 5X11	1	PHILIPS/SAMSUNG	C1
2.	CAPACITOR	470µF 25V	SSL 10X16	1	PHILIPS/SAMSUNG	C2
3.	CAPACITOR	0.1µF	Ceramic Capacitor COG RD16	2	PHILIPS/SAMSUNG	C3, C8
4.	CAPACITOR	130 pF	Ceramic Capacitor COG RD16	1	PHILIPS/SAMSUNG	C4
5.	CAPACITOR	1µF 16V	SSL 5X11	1	PHILIPS/SAMSUNG	C5
6.	CAPACITOR	33pF	Ceramic Capacitor COG RD16	2	PHILIPS/SAMSUNG	C6, C7
7.	CAPACITOR	100 pF	Ceramic Capacitor COG RD16	2	PHILIPS/SAMSUNG	C9, C10
8.	DIODE	1N4004		1	PHILIPS/SAMSUNG	D4
9.	DIODE	1N4148	SOD-27 (DO-35)	2	PHILIPS/SAMSUNG	D5
10.	LED	SLR-34MG [GREEN]	3mm	1	ROHM/LITEON	D3
11.	CONNECTOR	RJ11 AR-623PT-4	*	2	JST/ARIN	J1, J3
12.	CONNECTOR	MOLEX 5566-4A 39-29-0043	*	1	MOLEX	J2
13.	CONNECTOR	MOLEX 5566-2A 39-29-0023	*	1	MOLEX	J4
14.	RELAY	JQAP-12V		1	MATSUSHITA	K1
15.	TRANSISTOR	2N2222A	TO-92	3	PHILIPS/MOTOROLA	Q2, Q3, Q4
16.	RESISTOR	1.5K	CR-25	3	PHILIPS/SAMSUNG	R1, R4, R16
17.	RESISTOR	3.6K	CR-25	1	PHILIPS/SAMSUNG	R10
18.	RESISTOR	22K	CR-25	1	PHILIPS/SAMSUNG	R17
19.	RESISTOR	270Om	CR-25	1	PHILIPS/SAMSUNG	R5
20.	RESISTOR	5.1K 5%	CR-25	3	PHILIPS/SAMSUNG	R6 ,R8 ,R11
21.	RESISTOR	24K	CR-25	1	PHILIPS/SAMSUNG	R7
22.	RESISTOR	4.3K	CR-25	1	PHILIPS/SAMSUNG	R9
23.	RESISTOR	10K	CR-25	2	PHILIPS/SAMSUNG	R13, R12
24.	RESISTOR	4.7M	CR-25	1	PHILIPS/SAMSUNG	R14
25.	IC	OPTOCOUPLER SFH615A	DIP-4	1	SIEMENS	ISO1
26.	IC	OPTOCOUPLER SFH6156-3	SMD	1	SIEMENS	ISO1 **(Option)**
27.	IC	LM7805CT	TO-220	1	PHILIPS/SAMSUNG	U1
28.	IC	AT90S2313	PDIP-20	1	ATMEL	U2
29.	CRYSTAL	HC-49/U 1.8432MHz	*	1	MEC/MURATA	Y1
	CRYSTAL	HC-49/T 1.8432MHz	*	1	MEC/MURATA	Y1
	CRYSTAL	HC-49/E 1.8432MHz	*	1	MEC/MURATA	Y1
30.	FERRITE	BC3533		2	SAMSUNG	Fer1, Fer2
	FERRITE	BC3550		2	SAMSUNG	Fer1, Fer2

PCB Placement - Water Pump for CAL (Cassette)

2.4 ELECTRICAL & WIRING DIAGRAM

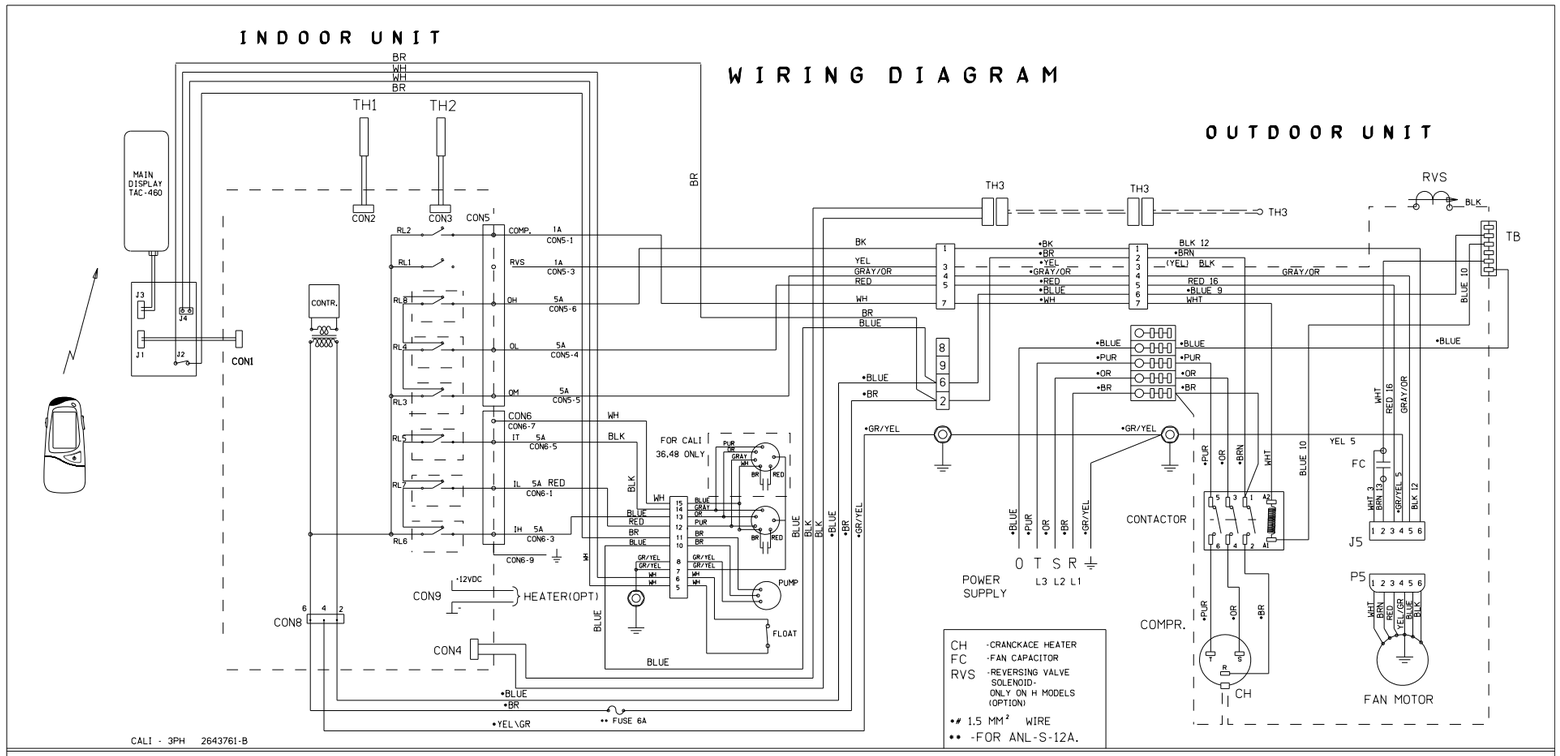
2.4.1 CAL 18 / CAL 24 / CAL 36, 1 PH

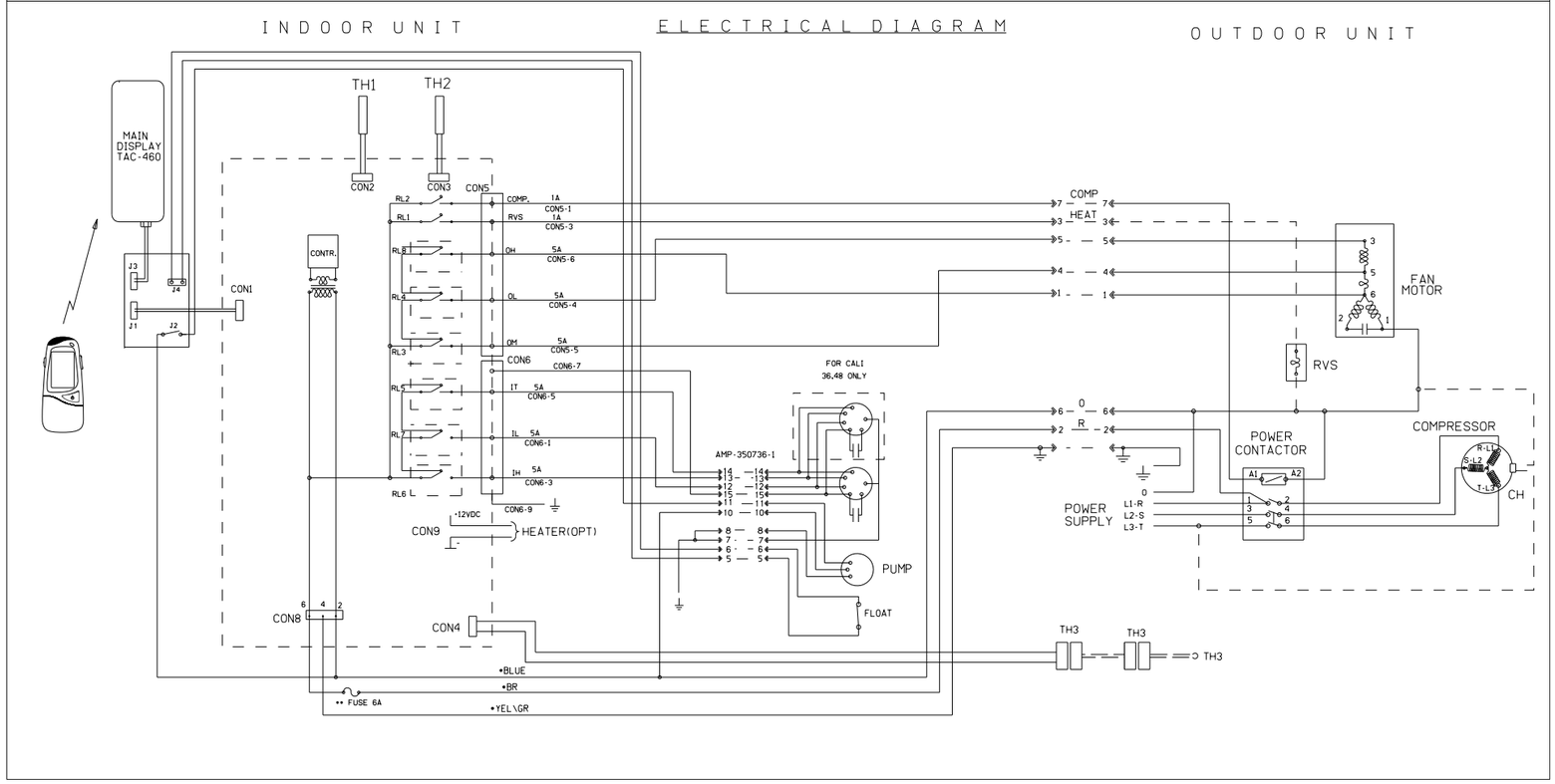




Important Note: Always refer to specific electrical diagram on the unit.

2.4.2 CAL 363 / CAL 483, 3 PH





Important Note: Always refer to specific electrical diagram on the unit.